SEAPRAP RESEARCH
REPORT NO. 26

A MICRO-MODEL OF DEMOGRAPHIC ECONOMIC BEHAVIOR

Fong Kwok Yuen
Population Studies
Economic Planning Unit
Kuala Lumpur, Malaysia
July 1978

A report of research undertaken with the assistance of an award from the Southeast Asia Population Research Awards Program (SEAPRAP), Institute of Southeast Asian Studies, Republic of Singapore

(an edited version)

ACKNOWLEDGEMENT

This study has been an extensive learning process for me. When I embarked upon it, my own exposure to the existing theoretical and empirical literature was but a fraction of what it is now. Equally significant, the progress of the study has resulted in the gradual build up of a software library for the analysis of survey data, and greater access to the use of computers in the Economic Planning Unit. This process has also been accompanied by increasing sophistication in the screening and analysis of large data sets.

I shall be grateful to my readers if they will treat this report as a product of the dynamics of this learning and investment process, rather than as an elegant, finished end product. If it serves a purpose at all in throwing some light on the intricate questions that we posed ourselves at the beginning, then all those long nights spent shivering in the solitude of the computer room would be worth the effort.

I am most grateful to Dr Pedro Flores for the long suffering good natured way in which he awaited the final report; to Professor Jose Encarnacion, without whose encouragement this report would not have appeared at all; to researchers and friends who have helped both in the specification of the model and the interpretation of its results - to Dr Amos Hawley, Dr Charles Hirschmann, Dr William Butz and Dr Julia Da Vanzo I owe a special note of thanks.

This study would not have been possible without the support of my colleagues at the EPU, and the encouragement of Dr Shamsuddin Abdul Rahman and Datin Dr Norlaily Abu Bakar, the Directors of the National Family Planning Board during whose tenures the study was undertaken.

Needless to say, I am alone responsible for the views expressed in this study and the errors and omissions contained therein.

Fong Kwok Yuen
Kuala Lumpur, Malaysia
July 1978

TABLE OF CONTENTS

CHAPTER I

MODEL SPECIFICATION AND RELATED METHODOLOGY

In specifying our model, we have attempted to put together a number of structural equations covering the variables that we were interested in. The model is looked at more as a framework on which to hang the relevant variables in a logical scheme. We have not attempted to be rigorously deductive, deriving every equation used from very basic assumptions of utility and then imposing upon the household its budgetary constraints. As stated, however, the model can be empirically verified and can be used to test a number of interesting hypotheses concerning the relationship between demographic and economic variables at the level of the household. These relationships can be stated in directional and impact terms. The results obtained should, however, be interpreted as exploratory data analysis, rather than confirmatory statistics. In that manner, they can assist us in better understanding the relationships posited.

The specification of the model is very much off-the-shelf, this being an exploratory study. We started off by specifying it very largely in a linear form, although the current literature indicates that some of the relationships posited may be non-linear. Subsequent investigation has shown that responses tend to be non-linear in the parameters, and dummy variables were then used to take into account these non-linearities.

The model, as it was originally specified, comprised a total of eleven equations and three identities. This we refer to as the base model. As it turned out, two of the equations were somewhat less than interesting, so that less time was spent on their investigation. In any event, the endogenous variables include income, employment, the desired number of children, the number of children actually surviving and the access to, and use of contraceptives. A somewhat more formal statement of the base model appears in Appendix A, the symbols of which are explained in Appendix B.

In the following paragraphs, we shall explain some of the terms used in the study. We do so with no claim of the "universality" of their application beyond the scope of this study, and with no apologies thereby.

Head of Household and Respondent

The model attempts to reflect the behaviour of households. Intuitively, we have identified two persons in the household who, we believe, make most of the decisions of the sort we are interested in. There is the head of the household, and he is generally a male according to the PES data. We have gone one step further to include only male heads of households in our study. The rationale of this inclusion becomes more obvious in Chapter III. Meanwhile, it should be stated that we are implicitly trying to approximate a nuclear family, and thereby introducing the second of our "Dramatis Personnae", the "Respondent".

The term "Respondent" in our model could indeed have been better chosen. However, as with most things, once it got stuck in the taxonomy of the computer programs used, it was felt best to leave it alone. The respondent is a woman in the reproductive ages, living in the same household as our head of household. In most cases, we would venture to guess that she is married to the head of household. However, as there is no other means of better identifying the mistress of the house, it was decided that this was the best that could be done.

Personal Income

The first economic variable that we come across, looking down Appendix A, is personal income of the respondent and the head of household. We are interested in income as it is thought to have some effect upon decisions in the population-related household decisions. In equations 4 and 5, which are symmetrical for both the head of household and the respondent, we are interested in the relationship between income, age, and education, controlling for the two group variables of community and stratum.

Studies of age earning profiles of developed and developing countries indicate a positive relationship between wage earnings and age, the latter interpreted most of the time as being a

proxy of experience. Given that a significant proportion of the earnings of the PES sample will be wage earnings, the hypothesis is a reasonable one. In any case, the capacity for accumulation also increases with age, and this should reinforce the positive correlation between age and personal income.

It should be interesting to know if age-earning profiles in Malaysia are concave. Preliminary evidence (Anand 19XX) indicates that this may indeed be the case. Thus, we have included a squared term that will have a negative sign should our hypothesis be found to be correct.

The experience of studies undertaken both in Malaysia and abroad indicate a very strong positive relationship between education and personal income. Indeed, this is the very thesis of the human capital school. We would like to have used the number of years of formal schooling to measure educational attainment, but this has not been possible. Instead, dummies are employed.

Household Income

In this equation, we are primarily interested in the proportion of variance accounted for by the incomes of the head of household and the respondent. If the majority of the households indicated are indeed nuclear households, it will be extremely likely that the proportion of variance accounted for by the above-mentioned will be rather high.

It has also been suggested that household income, rather than personal income is a better measure of the welfare of the household. In agrarian situations in particular, it is argued that to each household earner accrues not his marginal product, but that of the household average. In the subsequent equations of the model, household income will be used in this connotation, unless otherwise specified. Household income is probably a better indicator of wealth than either of the personal incomes.

Employment

It is not conventional for employment to be included in age-earning profiles. This is because age-earning profiles measure, for most of the time, persons who earn wage income, and therefore must be employed by definition. In our case, since

there is no separation between wage and non-wage income, employment is a relevant variable to include.

In the case of the head of household, it is very unlikely that the inclusion of the variable will significantly improve the equation's performance. However, in the case of the respondent, the reverse is likely to be the case.

Emmployment of Respondent and Head of Household

To explain employment of the respondent, we have included 3 endogenous variables, namely income of the head of household, household income of the respondent. Although there may be some multicollinearity, the specification can always be modified at a later stage. We expect household income to have a negative correlation with the employment of the respondent as opposed to the positive correlation between own income and employment. The received wisdom in this respect is that, unless household incomes fall to intolerable levels, in which case the respondent will offer her services on the job market, the respondent who is well off is unlikely to engage in employment outside the household. In time, depending upon the role-perception of the respondent, this may no longer be the case. This is likely to be the case especially as women who come into the labour market become increasingly better educated, and thereby command a better income. However, with the increasing difficulty of obtaining household help, the trend of liberation may be somewhat compromised.

This bring us to the age-pattern of labour force participation, which should be reflected in the age-pattern of employment. We postulate a quadratic function between age and employment, the respondent opting out of the job market when she is in the process of household formation and when she is busy with the raising of the children. As she grows older, the opportunity cost of her household production decreases as the children grow up so that, once more, she can consider outside employment.

It has been argued that a paradigm of the sort mentioned above is more typical of the developed countries, particularly those countries where there is a general shortage of labour. In agricultural economies, where household production can co-exist with employment in the environs of the "family farm", or the

small family shop, this need not be the case as the respondent can then combine household production with outside employment, so long as the "outside" employment does not interfere with her primary responsibility. It will therefore be interesting to look at the impact of statum upon female employment. Quite apart from the known, and higher labour force participation rate in the rural areas, the sort of situation as mentioned above is more likely to be relevant to rural and agricultural areas.

The number of children surviving is likely to be an influence upon the decision to participate or otherwise in the labour market. The presence of children, particularly young children, in the household will very likely increase the value of her household production and thereby reduce labour force participation, and with it, employment.

In general, the higher the level of educational attainment, the greater will be the probability of the respondent being employed. This is because the respondent is more employable and because she is more likely to offer her services in the job market, given the higher opportunity cost of her non-employment. However, some studies (Da Vanzo 19XX, Pang 19XX) have indicated that education is likely to have little impact upon labour force participation once own income has been accounted for.

In the case of the head of household, we expect age, education and own income to be significantly correlated with employment. The variance of the dependent variable is likely to be quite small, and its mean is likely to be close to unity. The quadratic age term should pick up the small plateau of very high participation rate in the prime years of labour force participation.

The social economic survey of 1967 indicated a trend of higher unemployment amongst school leavers at the higher levels of education. Given that the overall measured unemployment situation has worsened since 1967, it is possible that employment could be negatively related with educational attainment.

Number of Children Desired

There is some controversy as to whether the "desired" children concept can be meaningfully measured. Since the question is posed to household members at different points of the life cycle, it is argued that the older household members will tend to rationalize in retrospect to their own reproductive behaviour. If this is indeed the case, it would be possible to regress children against children surviving for the various cohorts and see if the coefficient of determination improves with age.

All the income variables have been included on the right-hand-side of the desired number of children equations. In general, the received wisdom suggests that, while the number of children desired increases with wealth, it is likely to decrease with the income of the respondent. Empirical evidence on the postulated relationships tend to be weak and contradicting. The developed countries seem to uphold the human capital hypothesis, but it would seem that, in developing countries in general, there is a negative gross and net relationship between the two, suggesting the existence of a higher "price" effect. An alternative view could be taken on the matter. If it is the case that the utility of children decreases with the advent of industrialization, then the inverse relationship between income and the number of children desired is in fact a realization of the decreasing value of children which has seen a lag in diffusion: The upper income groups become aware of this before the lower income groups, thus giving the inverse relationship when tested over cross-sectional data.

The relationship between household income and children desired may indeed prove to be non-linear, with the possible existence of "threshold" effects (Encarnacion 19XX).

Given the known and high correlation that exists between income and education, it would be quite difficult to interpret the impact of education upon children desired. In general, we expect a negative correlation between education and children desired.

There is likely to be an inverse relationship between urbanization and children desired. Quite apart from the value of children in agriculture as opposed to employment in the

secondary and tertiary sectors of the economy, the price of child-bearing definitely increases in an urban environment.

We have included the number of children surviving among the independent variables. In the first instance, it is assumed that, for household members who tend to rationalize their own child-bearing experience, there will be a positive correlation between desired and surviving children. In addition, the presence of children may encourage household members to adjust their expectations. Although an acceptable measure of this phenomenon is unlikely to be obtained from a one-time survey, the variable is nonetheless included.

Community as a group variable may also double as a proxy for religion. In particular, since all Malays are by definition Muslims, the community variable is likely to trap some of the variance due to differential fertility expectations between religions.

The effect of the independent variables on the desired children pattern for heads of household is likely to be symmetric in direction but not impact. It will be interesting to compare the regressions for the two household members.

Children Surviving

In general, the number of children surviving is used as the supply equation to the two above-mentioned demand equations. While there have been doubts raised as to whether this is indeed a meaningful measure of supply, there is not much of a choice as the variable intuitively is a neater measure than, say, number of children ever born as it accounts for replacement. The objective is to have live children, not dead ones. In practice, the interpretation of the effect of the independent variables in this equation can be problematic. Taking the case of the education variables as an example, a positive relationship could either be interpreted as saying that household members of lower educational attainment tend to produce fewer offsprings, or that they are less efficient in producing them. This is because the number of children surviving is by definition the difference between children ever born and children born alive and now dead, or children who have died as infants, perhaps.

Desired children for both heads of households and respondents are included among the independent variables. We expect a positive relationship between both pairs, with a stronger relationship perhaps for the wishes of the respondent. A multiplicative interaction term is thrown in for good measure. Among the other independent variables, age is likely to bear a strong relationship with children surviving as family completion proceeds with age. Age could also be reflective of cohort differences, particularly in respect of the access to contraceptives, and the (in)efficiency of traditional contraceptive methods. Both the attitude to family planning practices and the ever-usage of contraceptives provide for some explanation of the supply of children.

Access to Contraceptives

This variable should attempt to measure not only the physical element of access to family planning services but also that aspect of knowledge and motivation to find out on the part of the respondent. In essence, it is interpreted as the limiting measure between family planning and the family.

Given the present concentration of family planning outlets in the urban areas, it is likely that stratum will be an important independent variable. Both the educational variables are likely to be positively related to access.

Among the endogenous variables that are anticipated to have an effect upon access, household income and employment of the respondent are considered to be important. The first attempts to flush out the possibility that there are financial limitations in the access to family planning. This includes not only the cost of contraceptives but also the cost of going to a family planning clinic.

Employment of the respondent increases the probability that she comes into contact with others who might have used contraceptives, and indeed to sources of supply. This is perhaps more true for those in the urban labour force than in the rural.

Current Usage of Contraceptives

If our hypothesis concerning the use of contraceptives for birth limitation is correct, then a certain proportion of the variance of the dependent variable will be accounted for by the difference between the number of children surviving and the number of children desired. In respect of both the household head and the respondent, this constructed variable should have a negative relationship with current usage of contraceptives.

The usage of contraceptives could also be attributed to spacing requirements. There are two proxies that could be used. Firstly, if parity data were available, then it would be possible to regress parity against current usage of contraceptives. If a woman has had a recent birth, it then will be more likely that she would be using contraceptives for the purpose of spacing. Another variable that could be used is age, which is a proxy of parity. Unfortunately, it could be confounded with cohort differences, and the degree of completeness in family formation.

The use of contraceptives could be limited by their cost and availability. Household income and access to family planning services attempt to measure this supply constraint.

In addition, attitudinal variables could affect the usage of contraceptives. We have included some dummies for approximating this attitudinal limitation, as well as the education and employment variables. Employment is additionally important in that if the respondent were to work, the problems of childbearing superimposed upon a career could lead to the tradeoff of one for the other.

It should be emphasized that the study has been undertaken in the spirit of exploratory data analysis rather than confirmatory statistics. As such the specification of the model could be changed after further discussion. It does appear that while the theoretical

foundations for the income, children desired and children surviving equations are quite extensive, more thought will have to be given to other specifications. At the same time, there is every need to relate these deductively with established theoretical foundations.

Methodological Considerations

We propose to use three main methods of data analysis, all of which are derivatives of the general linear model (Karlinger and Pedhauzer 1975).

In the first instance, we look at frequency counts on the identified variables to get a feel for the basic parametric statistics. This will be followed by the use of cross-tabulations and the examination of the means of subgroups to see if bivariate linear relationships exist between the independent and dependent variable. In this conjunction, multiple classification analysis and the analysis of covariance will be used to ascertain the effects of other variables upon the postulated relationship. Finally, ordinary and two-stage least squares will be used to obtain the magnitude and direction of the impact of the independent variables upon the dependent, and also to look at the relative importance of variables and groups of variables.

The question may be rightly asked if we are going in for a methodological overkill, and letting the methodology dog wag the analysis tail. In this respect, it is useful to use an example for the purpose of discussion. Suppose it were found, in a cross-tabulation, that among the number of children surviving, the largest proportions of every row and column tended to be largest along the diagonal of the table. A check with subgroup means indicates that there is indeed a direct relationship between the mean number of children desired and household income. Further suppose that the zero-order bivariate correlation is significantly positive. Does this support the hypothesis that there exists a direct causal relationship between household income and fertility?

Not necessarily so. While we have an indication of the direction of the relationship, we are as yet uncertain of the strength of the relationship. Suppose it is established that household income is largely determined jointly by the incomes of

the head of the household and the respondent, and that these are in turn closely correlated with age, through the age-earnings profile. Even if an ordinary least squares regression were run on income and age against the number of children desired, thus obviating the impact of our intervening variable of age, we still cannot segregate the direct impact of income upon the number of children surviving. For, in the supply of children equation, the number of children desired is related to income. To use ordinary least squares of income and age will still result in an over-statement of the direct impact of income upon the number of children surviving. It neglects to point out that this gross impact also includes the indirect impact of income upon children desired and upon children surviving. And so, nothing short of looking at the entire system of equation, and sorting out all the direct and indirect impact multipliers will do the trick of formulating a model of household decision-making, based upon jointly determined endogenous variables.

While two-stages least squares produces unbiased consistent estimates of the parameters concerned, they are likely to be less efficient (possess larger variances) than their OLS counterparts.

Methodological Issues that Remain

The research, as it stands to date, has not addressed itself to some outstanding issues that the reader may have reservations about. For instance, as group data is used, it is advisable to weight the data by the inverse of the square root of the cell means. This will offset the known heteroskedasity that will result from unweighted results. At the same time, logit or probit analysis may have to be applied to the estimation of equations that contain dummy dependent variables, such as the employment, access and current usage of contraceptives equations. This will ensure that the estimates are unbiased, and that the fitted values will lie in the range from 0 to 1

In view of the comparative inefficiency of two-stage least squares, three-stage least squares could be used. However, considering the seratim properties of three least squares, particularly with respect to the sensitivity to mis-specification, this will only be done when we are convinced of the correctness of the models' specification.

CHAPTER II

DATA SET AND DATA MANIPULATION

In this chapter, we will devote some time to the derivation of the data used and describing the screening techniques that have been applied.

The Data Set

The post-enumeration survey of the 1970 Census (PES) was undertaken in order to check the extent of coverage of households by the census, and to check the validity of some of the data collected in the census. Given the large overheads of mounting this survey, and given the need for better knowledge, attitude and practice (KAP) data, it was decided to share out the overhead by allocating some additional expenditure to the PES for a KAP module to be canvassed instead of a KAP all by itself. Coincidentally, interest was also expressed by some other quarters for comprehensive income data so that, with the PES, we have the capability of testing out some of the hypotheses discussed in Chapter I.

The sampling frame of the PES was based on the census listing of enumeration blocks. A stratified sample was picked from amongst the 15,000 odd enumeration blocks, each of which contained from 60 to 80 households. A block sampling fraction of around 7.3% was adopted, resulting in a sample of some 44,000 households.

The first screening criteria exercised by the Department of Statistics was the selection of respondents from among ever married females between the ages of 15 to 44. This led to the shrinkage of the sample to some 18,639 households. In our attempt to approximate husband and wife combinations from the household data, the file was broken down into two subfiles on the basis of whether the record belonged to a male head of household or a female respondent. Next, the two files were merged across a set of common characteristics including household number, enumeration block number, region and state to ensure that the tuple of records generated came from the same household. This further resulted in a shrinkage of the sample. Listwise deletion of missing information further increased the toll to the present sample of 9,692 households. The sample, while being

still large, has suffered a shrinkage of some 78%. Naturally, it may be asked if the data screening procedures have generated a sample which is no longer as representative as it was meant to have been.

An indication of the characteristics of the sample generated is given in the tables of Appendix C.

In this rest of this chapter, we will look at some of these characteristics, and if needs be compare them with those obtained from PES. In general, it should be noted that comparisons for respondents are more meaningful as the respondents in this study represent a subset of the 18,639 mentioned in the PES report. However, in terms of the heads of households, the PES report discusses 25,654 of them, not controlled by the matching of a respondent as was the case in this study.

Age

In the PES report, 25% of the respondents were between the ages of 15 to 24, 41.4% between 25-34 and the rest between 35-44. In our sample, the percentages are 21.7, 44.7 and 33.6 respectively. The mean age of the sample of respondents was 30.93 years. In general, heads of households tended to be older, their mean age being almost ten years more than that of respondents. In general, the age distribution of heads of households tended to be more skewd towards the older age groups, while that of respondents was fairly normal with a skewdness of-0.052.

Group Variables

The distributions of heads of households and respondents by community were almost identical, and much closer than the same distributions in the PES report. This should be the case if the selection procedure did in fact manage to identify a large proportion of husband and wife pairs. In terms of the distribution of respondents by race, the PES came up with 57.9% Malays, 30.3% Chinese, 11.0% Indians and 0.8% Others. In our sample, however, there seems to be a larger proportion of Malays (60.2%) with proportionately fewer Chinese (27.3%). The difference in percentage for Indians came to within 1% and that for Others to 0.3%.

In terms of the distribution by strata for respondents, our sample had 75% of the respondents coming from rural areas, 13.3% from metropolitan towns and 11.7% from towns. The process of data screening on the basis of listwise deletion of missing cases seems to have increased since the rural sample registered 72.4% from rural areas, 15.1% from metropolitan towns and 12.5% from towns.

Educational Attainment

From Table 3.2 of Appendix C, it would appear that the heads of households seem to be better educated than respondents, at least in terms of the number of years of formal education. In contrast with the 40.8% of respondents who did not possess any formal education, only 17.7% of heads of households were in the same situation. At the other end of the distribution, only 3.1% of the sample of respondents attained upper secondary education and above, whilst the corresponding proportion for heads of households was 7.6%. Comparable figures were not stated in the PES report.

Income

It is therefore no wonder that the income distribution for heads of households differs markedly from that of the respondent. Heads of households were estimated to earn on the average of $265 as against $54 for respondents. The median group of respondents earned the average of $20 as opposed to the median group of heads of households who earn the average of $230. Only one respondent in our sample made it to the open-ended income category, as compared to 168 on the part of the heads of households. Respondents come from households with an income between $1 to $99.

Children Desired

Table 3.3 of Appendix C shows the distribution of the number of children desired by the head of the household and the respondent. In general, it may be seen that the mean number of children desired is somewhat higher (4.59) for heads of households as compared to the 4.05 for respondents. This difference could very well be due to the age distribution of heads of households, which, as we saw earlier, is substantially older than that of

respondents. As compared to the PES, it was found that 23.7% of respondents wanted between 0 to 3 children, as compared to 19.2% for our sample. Some 65.3% desired between 4 to 6 children, as against 70.7% for our sample. This could be the reflection of the stratum composition of our sample, or its composition by community.

Number of Children Surviving and Children Born Dead

From our sample, the mean number of children surviving was about 3.6 as compared to the 0.36 children born and who have died. The median category for the first variable happens to be the first category, in which none of the children passed away. Only 21.9% of the respondents suffered the loss of more than one child.

In the next chapter, we can begin to examine in greater detail the characteristics of our sample. While it should be recognised that the process of data screening has left us with a sample somewhat different from the PES, it does not seem to be too radically different.

Implications for Statistical Tests

Since the sample is stratified, the statistical tests applied in respect of confidence intervals, etc should be taken with a grain of salt. As yet, the literature on the robustness of tests like the T and F is not well developed, although there are indications that they may indeed be robust. Caveat emptor!

CHAPTER III

ANALYSIS OF RESULTS : GROUP MEANS AND MCA

The discussion of the results may be divided into two main parts. In the first, we look at the means of the subgroups we have selected on a bivariate basis. In the second, we look at the impact upon group means when the influence of other variables have been controlled.

In essence, we may regard multiple classification analysis as an extension of the analysis of subgroup means, when more than a pair of variables are in question. The particular application of MCA has been limited by the restriction of five treatment effects and five covariates. The choice of whether to make a variable a covariate or an effect is not entirely clear. Most of the time, we include age and community as covariates, as these two variables are least amenable to policy change. However, in the case of the income equations, it has been useful to look at age as a treatment rather than a covariate as age is a proxy for experience, and that at least is a probable policy handle.

It should be noted that the recourse to MCA was made after the application of dummy variables in regressions proved themselves somewhat more opaque for interpretation than was hoped. Further work done on this data set will use a different system of coding known as effect coding. The results of this coding scheme are somewhat more easily interpreted. Expressing group effects as the difference of the group from the mean of the dropped category effect coding expresses the regression coefficient as the deviation of that particular effect as a deviation from the grand mean.

Group Means and Multiple Classification Analysis

In the comparison of group means, we seek to establish the existence of a rational pattern of group means, given the independent variable. This type of analysis is particularly useful when it can be augmented with data concerning these group means, once other variables have been accounted for. From the initial bivariate comparisons, we can then observe the effects of other variables on the direction and impact of the initial independent

variable upon the dependent. It is also possible, on the basis of this analysis, to see if the relations postulated are essentially linear in nature and to suggest transforms should they prove to be non-linear. The interpretations of such transforms are not always easy to make, though.

The analysis of subgroup means and MCA are collected in the Tables of Appendix D. Owing to the large number of bivariate comparisons that can be made, we shall be selective in the discussion and leave the reader to browse over the "less interesting" relationships.

Income of the Respondent

The grand mean of income of the respondent was $54. Therefore, the income of the unemployed respondents was some $32 below the grand mean while the income of those employed was some $46 above. It may be surprising that respondents with no employment at all do receive any income. The reason for this is that the income data used includes both cash and kind, the latter being imputed by the enumerator.

Insofar as age is concerned, there seems to be a quadratic relationship between age and income. The highest mean income is reached in the 30-34 age group, and thereafter declines with age. This pattern is maintained even after other independent variables have been taken into account. This seems to be at variance with expected patterns of the age-earnings profile, which is generally linear for males. At the upper end of the age scale, it is evident that, once education has been controlled for, the negative impact of age seems to be diminished, implying that we are in fact dealing with a different vintage of human capital. This is less so in the case of the 35-39 bracket.

As may be expected, the impact of formal education is extremely significant especially as the education level rises. While the differences are small between those who have no formal education, and those who have completed some or all of primary education, the mean income of those who have completed lower secondary education is almost twice the grand mean. At the upper secondary level, the difference is almost six times the grand mean. These differences are maintained even after other independent variables are accounted for.

There is some variation between incomes of respondents by stratum. From cross-tabulations, the mean income for rural areas is around $51 while that of metropolitan respondents is $66, and towns, $63. Having controlled for educations and age, however, these differences are diminished. Stratum differences could reflect differences due to sectoral and occupational factors which are not accounted for in the analysis.

Income of Heads of Households

The mean income of heads of households is $266.

At first sight, the effect of employment upon the incomes of heads of households seems counter-intuitive. The mean income of the unemployed is almost $110 higher than that of employed household heads. It is well to remember at this stage that the proportions of those unemployed amonst heads of households is only 3%. Furthermore, income is inclusive of wage and non-wage income. Thus, once the effect of age has been accounted for, the differences of employment are much less significant, suggesting that the higher incomes of the unemployed are probably due to returns from accumulation, which is generally higher with age.

Unlike the case of respondents, income of heads of households is a monotonic function of age. Age here is generally interpreted as a proxy of experience. As we suggested earlier, income from non-wage income is also likely to be higher for older cohorts. Again, unlike the case of respondents, the gross effects of age on income are not moderated once education has been accounted for. We also find the greatest improvements in income amongst those who have completed some levels of secondary education. However, the differences even at the lower ends of the educational scale are more significant than in the case of respondents.

Differentials in incomes resulting from stratum differences are more marked than in the case of respondents. Mean incomes for rural, towns and metropolitan areas are, respectively, $272, $356 and $432. Again, the net differentials are smaller than the gross, suggesting that part of the latter are explained away by age and educational differences.

Household Incomes

In general, we try to explain household incomes in terms of the incomes of heads of households and respondents. Some 70% of the variance is attributable to the two dependent variables, the rest of it coming perhaps from other earners in the household. Insofar as the role of the head of household's income is concerned, the relationship is as expected. There would seem to be a significant contribution of the respondent or other earners to the income of households in the lower income ranges. On the other hand, there seems to be some degree of understatement of incomes of households. This apparent understatement could also be the result of a downward bias attributed to the estimation of the mean income of the open income category.

Employment of Respondents

There does not seem to be a clear-cut relationship between employment of the respondent from the cross-tabulations. At the upper end of the income scale, employment rates are uniformly high, showing that there exists positive supply responses for mean income groups $580 and above. For groups with mean incomes above $20, employment rates are also generally high. For the mean income group of $20, which comprises the bulk of the female population, the employment rate is much closer to the grand mean of 41%. In this category, we would expect, are unpaid family workers and part time workers who do not work for more than the requisite 25 hours. It is probably these two groups that are classified as earning some income.

There appears to be an inverse relationship between incomes of heads of households and the employment rate of the respondent. This is supported by the evidence received from studies of female labour force participation in the developed countries, in particular. However, the effect is somewhat less pronounced once the effect of other independent variables has been accounted for.

The effect of the number of children surviving does not seem to have any correlation with the level of employment. In general, we expect a negative relationship between employment and the number of children surviving. However, it could be in this case that the variable selected is not defined well enough to

capture the thought. If the number of young children had been available from the survey, then the effect could have been different.

In conformance with the empirical evidence of similar studies, employment rates are significantly higher in the rural areas as opposed to the urban and metropolitan area. This is probably because it is generally possible to be employed in an agricultural environment, around the household, and still undertake the traditional duties of a wife and mother at the same time.

Employment of the Head of Household

The statistics derived from our analysis of employment of households support our apriori belief that the employment of the head of household is uniformly high at 97% and that the variables proposed are unlikely to explain whatever little variance there is left to be explained. There are minor variations due to stratum differences, and some degree of unemployment among those with no formal education, but the other results are of little interest.

Number of Children Desired - Respondents

The relationship between household income and the number of children desired is quadratic. The greatest mean number of children desired occurs for the group with mean income of $105, and declines on both sides of the income scale. One exception to this pattern occurs for the group of households with zero income, although the number of households in this category is quite insignificant. Looking at the gross effects as contained in the cross-tabulations, the greatest impact is made at the upper end of the income where the mean number of children desired for the income category $380 is -0.01 from the grand mean, as compared with -0.10 for the $580 category, and -0.33 for the $840 category. The quadratic pattern is maintained even after the effects of other independent variables have been taken into account.

A less pronounced quadratic pattern is observed in the case of the relationship between income of the respondent and desired family size. The highest number of children desired occurs in the $60 mean income group. Once education of the respondent is accounted for, however, the relationship though

still negative, becomes less clear, especially in the range between $230 to $380.

In line with our apriori assumptions, there exists a direct relationship between the number of children desired and the number of children surviving. It is interesting to note that for the group with less than five children, the number of children desired is greater than the number of children surviving. The reverse is true for households having five children or more. It is very tempting to interpret this literally as the existence of "excessive" fertility for these households. However, the very positive relationship between number of children desired and children surviving may suggest that the respondents are only trying to rationalize. While there may indeed be some truth in that assertion, it could also be true that most families having less than four children have not completed family formation. For those respondents some support for this hypothesis is offered by the fact that once age is taken into account, the relationship is even stronger.

The monotonically negative relationship between education and the number of children desired is well known. In the case of gross effects, these are often mixed up with the "price" effects of child upbringing on the mother's time, which increases with education. Nonetheless, even after income of the respondent has been accounted for, there still remains a negative relationship suggesting that the quality of children becomes more significant to those with higher education. Unfortunately, we cannot standardize for the latter in this study.

Stratum differentials of desired children tend to support evidence available elsewhere. It is understandable that in an agrarian setting the value of the child's contribution to household income is possibly bigger as compared to urban and other non agrarian environs. It is interesting also to note the impact of adjusting for age and community upon children desired. The effects are slight in the case of rural areas, but more significant with respect to urban areas.

Number of Children Desired - Head of Household

The mean number of children desired is higher for heads of households at 4.59 as compared to respondents. In general, the relationship between the independent variables and the dependent variable is similar to that of respondents.

Insofar as income of the household is concerned, the pattern is once again a quadratic one, peaking at $105. This seems to reinforce the idea that households belonging to this income group seem to have the highest preference for children.

Income of the head of household has a gross negative relationship with the number of children desired, but the strength of the relationship is less clear once income of the household, with head of household income very closely correlated, has been taken into consideration.

The relationship between children surviving and the number of children desired is similar to that of respondents, although it is generally higher at all levels of the number of children desired.

There is a negative correlation between education levels and the number of children desired by the head of household. However, the effects of education on children desired is less intense than in the case of respondents especially after the effects of income have been controlled for. Thus, while the number of children desired for respondents with no formal education is 4.74, the corresponding figure for heads of households is 4.85.

Differentials between stratum are similar to those for respondents. Rural heads of households tend to prefer larger family sizes as compared to heads of households in towns and metropolitan areas, in that order.

Number of Children Surviving

There exists a positive correlation between the number of children surviving and the number of children desired by respondents. However, while the mean number of children surviving exceeds the number of children surviving and exceeds the number of children desired for those who desire two children or less;

the reverse is true for those desiring three children or more. This is explained by the fact that a large proportion of the respondents interviewed were not at a stage of having completed family formation. Indeed, once age has been accounted for, the relationship between the number of children desired and children surviving becomes less intense.

A similar correlation exists between the number of children desired by heads of households and the number of children surviving. It should be realised that the gross effects of children desired on children surviving becomes less pronounced once children desired by the respondent has been accounted for.

Levels of education are inversely correlated with the number of children desired. The mean number of children desired for respondents decreases from 4.13 for those with no formal education to 1.75 for those with upper secondary education. The relationship between education of the head of household and children desired is less significant than that for respondents. This seems to reinforce the point that the number of children desired is more closely correlated with variables pertaining to respondents than in the case of heads of households.

Number of Children Born Alive and Now Dead

The mean number of children born dead is 0.36.

While there is a negative correlation between household income and the number of children born dead, the relationship is not a monotonic one. The income group with the greatest mean number of children surviving is the $60 group. After a mean income of $155, the mean number of children born dead decreases significantly from 0.41 to 0.11 at the highest income level.

There is again no clear linear relationship between the number of children surviving and the number of children born dead. There is a corresponding increase in the number of children born dead for households having between one to four live children. Thereafter, the number of children born dead seems to decline until seven live children, whereby the group mean is equal to the grand mean. It should also be noted that the direct relationship between children surviving and children born dead diminishes in strength as other independent variables are controlled

for. The inverse relationship depicted for households with larger number of children surviving becomes even more significant as independent variables and covariates are controlled for. This seems to suggest there are physiological factors involved for high parity women which also ensure their production of live children. Admittedly, this finding is rather unusual and will have to be further verified.

Of all the socio-economic variables used, educational levels of the respondent are most highly correlated with children born dead. The mean number of children born dead decreases from 0.53 to 0.06 as educational levels increase from no formal education to lower secondary. Rather surprisingly, the number of children born dead then increases somewhat for those who have obtained secondary education.

A negative correlation is also observed between the educational levels of household heads and the number of children born dead. This time, the gross relationship is negative throughout. However, after adjusting for the variance accounted for by other independent variables, the negative effects are reduced.

Differentials between rural and urban areas are again quite marked, reflecting the differentials that exist in the availability of preventive and curative medical facilities. While the mean number of children born dead in rural areas is +0.07 of the grand mean, it is -0.18 for towns and -0.24 for metropolitan areas.

Access to Contraceptives

Some 69% of the respondents interviewed had access to contraceptives. In general, it appears that the access to contraceptives increases with household income. At the lower end of the income scale, only 50% of respondents had access to contraceptives as compared to 80% at the upper end. However, as there is a positive correlation between household income and educational levels, it is not surprising that the significance of household income decreases with the introduction of the educational variables.

From cross-tabulations, it would appear that employed respondents have less correlation as compared to their unemployed

counterparts. However, once the effect of other independent variables is controlled for, the differential is found to be insignificant.

Educational levels for both respondents and heads of households tend to be positively correlated with access to contraceptives. It would appear that education of both heads of households and respondents mutually reinforces better access to contraceptives. Quite evidently, as the question of access is put to the respondent, the more significant relationship is that between the education of the respondent as compared to that of the household head.

On the surface, it would appear that there are slight differences in the access to contraceptives between urban and rural areas. However, these are found to be very small and are probably insignificant. This is again quite surprising since the national family planning program was essentially urban based in its early years. Contrary to expectations, it would appear that respondents in metropolitan areas have 2% less access to contraceptives as compared to rural areas, once the educational and income variables are explained. Smaller towns by comparison seem to offer more accessible service points.

Current Usage of Contraceptives

The grand mean of the number of respondents currently using contraceptives is 17%. Of these, it would appear that the proportion is greater for the well-to-do household. The relationship is not too clear-cut for households of average income less than $20, but for income levels higher than that, the relationship is almost monotonic. The significance of the income variable continues slightly diminished after other variables, including education, have been accounted for. This seems to suggest that the cost of using contraceptives, which includes not only the cost of contraceptives per se but the indirect cost of obtaining them is still a significant factor for the lower income groups.

The small differentials between usage of contraceptives between employed and unemployed turns out to be even smaller once the effects of other independent variables are taken into consideration.

Quite obviously, access to contraceptives will significantly determine the present usage. This is confirmed by the differential of 17% in the adjusted value for access.

Again, as expected, the level of current usage of contraceptives increases with the level of education. Bteween the lowest and highest levels of education of the respondent, there is net differential of 7% in the use of contraceptives. While the educational level of the head of household is significant, it is less so in comparison to that of the respondent.

CHAPTER IV

ANALYSIS OF RESULTS : OLS AND TSLS

In the analysis of subgroup means, and multiple classification analysis, emphasis was given to the sign and pattern of relationship between independent and dependent variables. In this section, we will still be interested in the direction of relationships, but in addition we shall also pay attention to the strength and significance of the relationships.

Income of the Respondent

The OLS regression explains some 41% of the total variance of the independent variable.

Of the independent variables, education and the employment status of the respondent account for 38% of the variance. Employment is positively related income, in a much stronger fashion than for the respondent. Education likewise is positively associated with income. Both variables are significant at a 1% level.

There is a significantly quadratic relationship between age and income of the respondent. This is an unusual pattern as most age earning profiles are not concave with respect to the origin. If age is a proxy for experience, then it would appear that subsequent years of employment do not add to greater income. By and large, age accounts for only a small proportion of the total variance. It could be that relatively few women in the sample are in occupations that require considerable experience, or that women are less prone to develop their careers to the same extent as males.

Community differences in income are all significant at a 1% level, with Chinese and Indian women earning an average of $21 and $22 respectively above their Malay counterparts. Since occupation could not be captured as it was perfectly colinear with employment (people who are not employed do not belong to an occupational group), community could be in fact picking up some of the variance accounted for by occupational differentials between the various communities.

In general, the TSLS regression tends to reflect the same pattern of explanation for income of the respondent. However, it becomes clear that the estimates are less efficient, as standard errors of the coefficient are generally larger, and T values correspondingly smaller. Therefore, though the employment and stratum variables take on the wrong sign, they both become insignificant. It thus turns out that education is the primary variable in the determination of earnings of the respondent.

Income of the Head of Households

In the OLS estimations, the independent variables explain some 35% of the variance of the income of the head of household. As may be expected, education accounts for a large proportion of the aforesaid variance, with community explaining most of the rest. Unlike the case of respondents, experience, which is proxied by age, is more significant. The earnings profile remains concave with respect to the origin, as was the case with respondents, showing a peaking of the effect of experience upon earnings before the older working ages.

As was pointed out in the analysis of group means and the multiple classification analysis, there is a significant impact of employment status upon income. The reasons advanced in the earlier paragraph will be checked in greater detail.

TSLS analysis tends to confirm the direction and magnitude of the estimates of OLS. In both regressions, the income of the "other races" is not significantly different from the mean of Malay income, probably on account of the very small sample size of this group.

Household Income

Income of the respondent and that of the head of household together account for some two-thirds of the total variance of household income. Of the two explanatory variables, income of the head of household is much more significant and accounts for all but 3% of the 67% of variance.

The negative coefficient of YR with YH does not mean that respondents have a negative contribution to household income.

Rather, this reflects the negative relationship between the latter and the respondents own income. Hence, the negative coefficient.

Employment of the Respondent

The employment equation as estimated by OLS accounts for some 31% of total variance in employment of the respondent. The most significant explanatory variables are own income, community and stratum in that order. Own income accounts for some 21% of total variance. On the other hand, there is a significant negative impact of household income, and income of the head of household upon the respondent's employment status. Also significant in the OLS estimation is a negative impact of number of children surviving upon employment status.

Once the effect of own income is accounted for, the effect of education upon employment seems to be negative. Thus as compared to those with no formal education, respondents who have attained upper secondary education also have a rate of employment some 33% lower. It would seem that education per se has the effect of encouraging respondents to devote a greater proportion of their time to household production, of which childbearing is only one aspect. This finding is rather surprising in comparison to similar studies (Da Vanzo 19XX) but it is generally recognised that the pure effects of education on employment are generally weak.

In the TSLS estimations, the more significant variables keep the same sign as the OLS. However, age and the number of children surviving have reverses in sign, but are not significant at the 5% level. The significance of stratum as an explanatory variable also tends to diminish, with differentials between employment in rural and metropolitan areas becoming insignificantly different at the 5% level.

Employment of the Head of Household

As with most other comparable studies, there is very little variation in employment rates that can be explained using a purely linear model. Employment of males tends to be socially determined, and this is especially true for a developing country like Malaysia Thus, the employment equation for the head of household only explains

some 7% of the total variance. Most significant of the explanatory variables are age, and surprisingly, the number of children surviving. The positive relationship between employment and the number of children surviving is probably indicative of the dependency problem, given the rather young age structure. Since the male accounts for the greatest share in providing for the household, it becomes understandable for dependency to be affecting male employment more significantly. It could be argued that the greatest effect of young children would be upon the employment of the respondent. But in a largely agrarian female labour force, it is conceivable that the impact could be considerably less than in developed countries, where female employment is greater and not limited exclusively to household production.

Education has generally significant and positive effects upon employment of the head of household, controlling for the effects of income. The latter are seen to be negative. As explained earlier, this need not be construed as an indication of negative supply response.

In the TSLS estimates, signs of the most significant explanatory variables remain unchanged. Stratum differentials become insignificant at the 5% level, and so do some of the community and educational differences. But community and education as a cluster still make significant contributions to the total variance.

Number of Children Desired - Respondent

The OLS estimation shows the children desired function as explaining some 19% of the variance of children desired by respondents. About half of the variance is accounted for by the number of children surviving. This could suggest that respondents tend to rationalize desired children with surviving children. Income variables, which are all explained by education, tend to be insignificant. Education itself tends to have a negative effect. It would seem possible that education encourages greater attention to the quality rather than the quantity. Age bears a negative relationship with children desired. Presumably, women at the end of family formation might have revised their ideas regarding the desirable size of families. However, the negative relationship is generally weak.

Community and stratum differentials are significant at the 1% level. Respondents in metropolitan areas, ceteris peribus, desire a family size some 0.36 less than their rural counterparts. This could be reflective of the higher cost of child upbringing in urban areas as well as the reduced utility for child labour. It should also be noted that Indian respondents desire a family size some 0.74 less than their Malay counterparts, and indeed less than the Chinese, who in general are more urbanized and enjoy higher mean incomes.

In the TSLS analysis, household income is seen to have a positive impact on children desired. This suggest that children are not inferior goods at all and tends to support the analysis of Becker et al who maintain that the negative correlation often observed between income and number of children desired could be the result of the lack of definition of the effects of education, and of simultaneous equation bias. By comparison, there is a negative impact of income of the respondent with the number of children desired, again upholding the hypothesis of those who subscribe to the "New Economics of the Household". The negative impact of income of the respondent shows that, even in a developing economy, the effects of the opportunity cost of a woman's time in economic activities outside the household have significant bearing upon household formation decisions.

Insofar as the other variables are concerned, the sign pattern remains the same except for two categories in the education variable. Here, it would appear that at the highest two levels of education, there is a greater preference for children. This is rather difficult to accept, and could be further investigated.

Number of Children Desired - Head of Household

The OLS estimation of children desired by household heads explains some 14% of the total variance of the variable. Income of the head of household is positively related to children desired. However, household income, which is to a large degree explained already by the income of the head of household, takes on a negative sign reflecting the respondent's contribution. The sign on the education variables are negative throughout.

Age tends to be positively related to children desired, showing perhaps the preferences of older cohorts for larger families. Insofar as the community dummies are concerned, it should be noted that there is a reinforcing effect of child preference of the respondent. Indian household heads again have a mean number of children desired of -0.99 below their Malay counterparts, and this is significantly lower than Chinese household heads. Stratum differences again reflect the pattern as seen in respondents.

Whereas the quadratic term for household income was significantly negative at 5%, it is no longer so for the TSLS estimates. Instead, household income has become more significantly negatively related to children desired. Age deteriorates in significance, while education experiences a change in sign throughout. There is also a change in sign for heads of households in towns, showing a relative preference of +0.23 over rural heads of households.

Number of Children Surviving

The OLS equation for children surviving performs quite well by comparison, explaining 47% of total variance. Among the more important explanatory variables are age and education. Age, of course, is related to the degree of family completion and is therefore positively correlated. Children born dead seem to have a negative impact upon children surviving. On the face of it, the sign can be explained but is again likely to be the result of simultaneous equation bias, as the TSLS analysis will show. Never-usage of contraceptives is negatively related to the number of children surviving. This is again contrary to expectations. However, this could be explained if high parity women show a greater use of contraceptives over their lifetime than low parity women.

Community differentials are not significant in general. While stratum dummies are significant as a group, there would appear to be no significant difference in the number of children surviving between towns and rural areas, although the differential between metropolitan and urban areas is significant at 5%. The attitude toward family planning variables is not significant, nor are the measures of formal education for heads of households. However, the education of the respondent is negatively related to children surviving.

The results obtained from TSLS are somewhat ambiguous. There exists a negative relationship between children desired and children surviving which is difficult to explain. There is however a positive relationship between children surviving and children born dead, giving some support to the replacement hypothesis. Owing to the correlation between age of the head of household and age of the respondent, only one of the age variables emerges to be significant. The attitude-towards-family planning variables remain insignificant. Insofar as education is concerned, it would seem that respondents with some formal education have significantly more children. The other categories seem to show no significant differentials in fertility. Insofar as education of the head of household is concerned, the only significant differential is for heads of households with upper secondary education. In that case, they appear to have significantly fewer children surviving. Never-usage of contraceptives again takes on a negative sign, giving further support to the explanation provided for this phenomenon in the OLS case.

Community differentials are significant at the 1% level, with Chinese and Indians having more children surviving, all other factors taken into consideration. This is again rather surprising as the OLS estimates are not significant. Stratum variables indicate a negative differential between metropolitan and rural areas, but with no significant difference between metropolitan and rural areas, and no significant difference between smaller towns and rural areas.

Children Born Dead

The CBD equation accounts for 15% of the variance observed in the variable. In the OLS estimation, the most significant variables turn out to be the age and community variables, with number of children surviving accounting for some 3% of the variance.

As may be expected, household income is inversely related to the number of children born dead. This reflects not only on the home environment and nutrition, but also reflects better access to medical services among the well-to-do. There is another very significant negative relationship between the number of children surviving and the number of children born dead, indicating the higher incidence of infant and childhood mortality for households with

larger numbers of children. Education of both head of household and respondent tend to exert a negative impact on the number of children born dead, thus indicating the greater propensity of educated couples to have more live offsprings.

Differentials between urban and rural areas in the number of children born dead reflects the relative penetration of health services, and perhaps higher standards of public health. In spite of all the other variables, the community dummies show significant differences between the various races. Both Chinese and Indians show lower incidences of child mortality, with the difference between Malays and Chinese more marked.

In the TSLS equation, income is again negatively related to child mortality. Age of the respondent is positively related, showing either cohort effects, or the greater extent of child mortality in households in which the respondent is closer to the end of family formation. However, the sign of the number of children surviving variable becomes positive, thereby indicating the higher incidence of child mortality among households with greater numbers of children.

By and large, the education variables become insignificant, indicating a weak effect of education upon child mortality. In part, the indirect effects of education upon household income could have reduced the explanatory value of the educational variables. Stratum differentials also tend to be less marked, as are community differentials. However, the differential in mortality between Malays and Chinese still remains significant.

Access to Contraceptives

Like employment of the head of household, access to contraceptives remains one of the less well explained variables. In the OLS formulation, only 9% of the total variance is accounted for by the regression. It should be pointed out that this variable measures not only the physical availability of contraceptives, but to some degree the motivation of the respondent to find out if contraceptives are available to her, either in her own locale or elsewhere.

As may be expected, contraceptives are more accessible to households of a higher income level. Employment status of the respondent shows an insignificant effect, while the age of the respondent is negatively correlated. It may be that age reflects an attitudinal barrier to contraceptives, or it could be that women approaching menarchy have less need for contraceptives.

The attitudinal variables would seem to have some impact on knowledge of access to contraceptives. Clearly, those in favour of family planning register a higher coefficient, but it should be pointed out that even those who oppose the concept of family planning have better knowledge of obtaining contraceptives than those who are indifferent in family planning. Education of both the head of household and the respondent show monotonically increasing effects upon access to contraception.

It is also interesting to note that there seems to be no significant difference between urban and rural respondents in their access to contraceptives although access of non-metropolitan urban respondents is significantly greater. This could be reflective of the lack of supply outlets in the fringes of metropolitan areas, especially in squatter areas. Having adjusted for the effects of location, community differences are not significant for Indians and other communities, as compared to Malays. However, it would seem that the Chinese have less access to contraceptives than their Malay counterparts.

The effect of income upon access to contraceptives is increased in the TSLS estimates, both in term of the size of coefficient and the significance. Employment status of the respondent is shown to positively affect access to contraceptives, and significantly at a 1% level. Attitudinal variables lose their significant difference between those who approve family planning and those who are indifferent to it. The educational variables tend to lose their significance at the lower levels - there appear to be no significant differences in access to contraceptives at the all primary and some primary level. However, for the secondary and upper secondary levels, the effects turn perverse. It is not clear at this stage why this should be so.

In the TSLS formulation, both income and employment of the respondent take on negative signs. However, none of these are significant at the 5% level. Access to contraceptives remain positively related to current usage. The difference between number of children surviving and the number of children desired takes a sign change, being significant only for respondents only. The age variables are no longer significant under the TSLS estimates. Attitudinal variables become more significant, but the differential in current usage between those approving family planning and those indifferent seems to indicate a higher usage for those who are indifferent, which aprori does not seem to be correct. The differential for the two other groups is perhaps acceptable.

Under the TSLS formulation, the education dummy variables lose their significance at the upper end of the education scale, while at the bottom end, the signs turn perverse. It would appear that respondents with some primary and all primary education tend to be lower in current use of contraceptives than those without formal education. Stratum differentials tend to be insignificant while community differentials are significant at the 5% level only between Malays and Chinese, although it is generally true that all other communities tend to have a higher proportionate use of contraceptives.

The TSLS results are in this case more difficult to interpret than the OLS ones.

CHAPTER V

THE IMPLICATIONS FOR POLICY

We have repeatedly emphasized that this is a preliminary study and that the results should be looked at from the point of view of exploratory data analysis rather than statistical confirmation. Nonetheless, it is useful to draw together some of the results of the study in a more coherent manner in order to see what there is in terms of useful and workable hypotheses for further research and policy analysis.

We should begin by first noting the position of Peninsular Malaysia with respect to demographic transition. Cho and Retherford (1975) have undertaken a purely demographic decomposition of crude birth rates in Malaysia and have found a decline in the crude birth rate of 19.3% between 1960 and 1970, from 42.9% to 34.6%. Almost 67% of the overall decline may be attributed to change in the age structure of marriage. About 28% of the overall decline in fertility is attributed to changes in marital fertility and the balance to changes in the age structure of population.

This demographic analysis highlights the main features of the demographic transition in the First Development Decade. It does not, and should not be expected to, describe the dynamics of the demographic transition as it is, per se, which is an exercise in comparative statistics. It is possible that changes in the pattern of education amongst women had led to a postponement in the age of first marriage. Indeed, the average age of marriage rose from some 18 years to 23 years between 1957 and 1970.

It is equally possible that improving levels of education amongst women have led to concommittent improvements in the opportunity cost of their household production activities, so that an increasing proportion of women in the urban areas at least have chosen to take up full time employment activities outside the home. In attempting to find a new equilibrium between home activities and outside employment, in terms of the allocation of their time, new patterns of desired family size have begun to emerge.

Changes in the level of education may also bring about change in taste. There may be a shift in the preference for child quality rather than quantity and this brings about changes in the number of children desired.

Improving levels of education can also have the effect of improving the woman's ability to have live births, and weighs upon the odds of their survival to adulthood. This will ultimately have an impact on the number of children desired.

In looking at the decade between 1960 and 1970, one should also bear in mind the changes in material welfare measured in income terms. It is without doubt that per capita real income levels have improved over time, although it has been questioned whether the distribution of income has improved. Be that as it may, changes in the level of real income are likely to have had different effects upon fertility behavior. Higher levels of household income may induce more women to withdraw their participation from the labour force and that, ceteris paribus, can have a pronatal effect. Higher income levels will mean that the household can afford larger and better families at one and the same time. On the negative side, levels of infant and childhood mortality tend to decline with income increases, so that fewer children need be born in order that a specific number survive to adulthood. Improving income levels also means that more effective methods of contraception become available to a larger proportion of the population.

One also should not ignore the trend of increasing urbanization. Not only do the benefits of having children change from a traditional agrarian setting, the cost of maintaining a large family is also likely to increase. Furthermore, family structures are likely to change with considerations for the cost of taking care of young children. Access to more efficient contraceptives is also likely to increase. On balance, urbanization is likely to have a negative impact on fertility over a long period. It does not mean that a rural-urban migrant is likely to change his desired family size overnight. On the contrary, it may have a pronatal impact if higher income levels permit having larger families than was possible before.

At the cost of being repetitious, we have tried to pull together the main factors that could have been associated with fertility changes in the past. These same factors are expected to continue working into the near future, and are thus likely to continue influencing fertility behaviour.

This does not mean that future fertility is necessarily an extrapolation of the past. In the first instance, changes in urbanization, real income levels and the distribution of income, as well as improvements in the level of education are likely to proceed at different levels of these factors which are generally of a non-linear nature. The existence of thresholds which have been alluded to earlier (Easterlin, 1974, Encarnacion 1977, Tabarah 1974) are extremely significant for the policy maker and the planner.

In order to illustrate these non-linearities more graphically, we have rerun a portion of the MCA model comprising the following equations :

EMR : AGER, YHH, YR, NCS, EDNR $\begin{smallmatrix}1\\1\end{smallmatrix}$ STR, COM

DESR : AGER, YHH, YR, CBD, EDNR $\begin{smallmatrix}1\\1\end{smallmatrix}$ STR, COM

DESHH : AGERH, YHH, CBD, DENHH $\begin{smallmatrix}1\\1\end{smallmatrix}$ STR, COM

NCS : DESR, DESHH, YHH, EDNR, USENEV $\begin{smallmatrix}1\\1\end{smallmatrix}$ STR, COM

CBDR : AGER, YHH, CEB, EDNR, EDNHH $\begin{smallmatrix}1\\1\end{smallmatrix}$ STR, COM

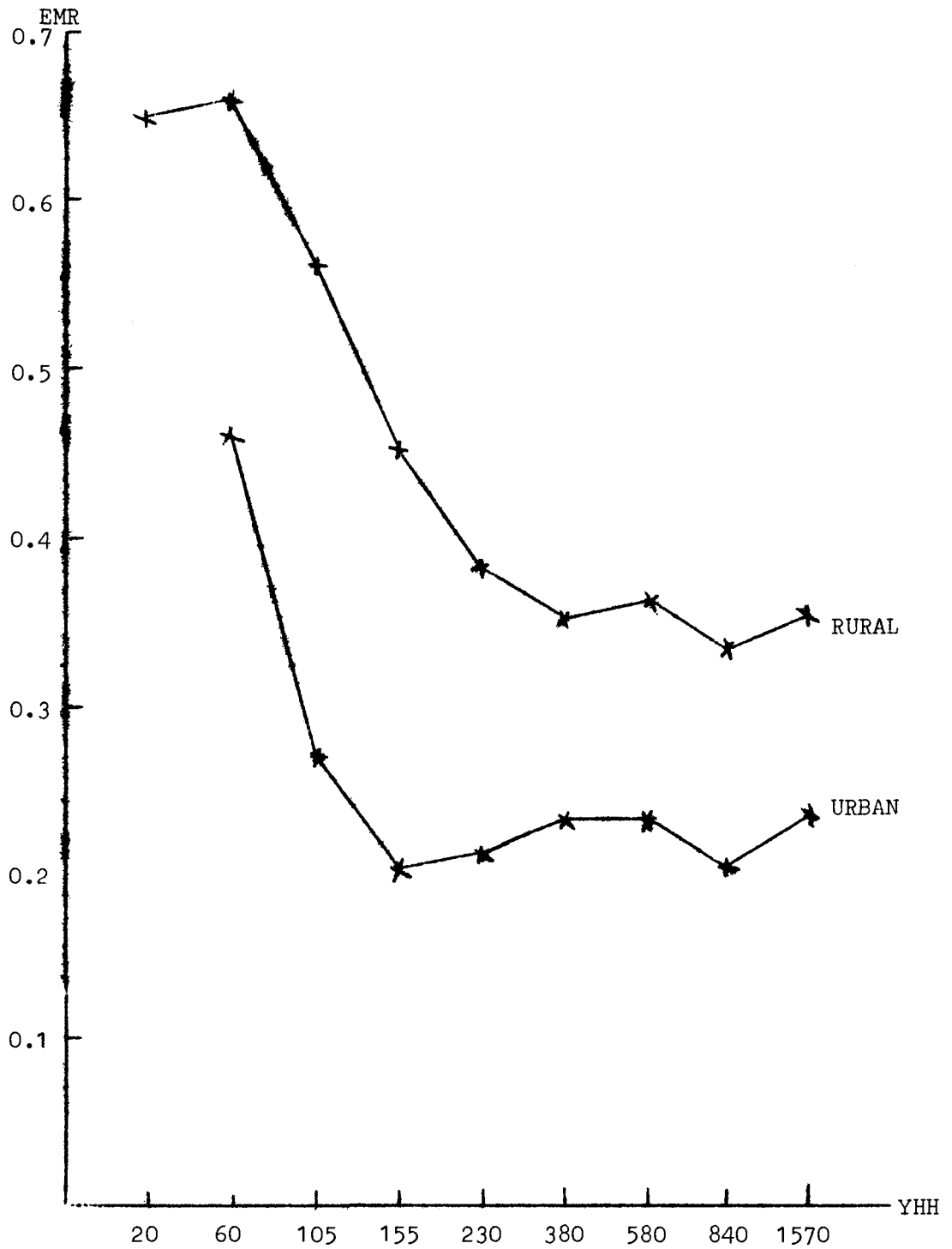
The variables after the bar $(\begin{smallmatrix}1\\1\end{smallmatrix})$ are included as covariates.

The MCA's are also run for urban and rural areas separately to see if the results are homogenous across strata. Also, the DESR, DESHH and NCS equations are runned for the various age groups.

An apology is needed for this simplification of the base model. With the base model, we were trying to look at as many variables as possible at one time. Having gone through the exploratory phase, a more compact representation of the relationships posited is given discarding those that are fairly well known, examples YHH and YR, or those that are likely to add little to the analysis, examples EMH and YH. For simplicity, we have also decided not to explore further the relationships of ACESS and USECRR as they tend to be affected by variables of a more transitory nature which we find difficult to capture. This is particularly true of USECRR.

FIGURE 1

EMPLOYMENT RATE OF RESPONDENT BY INCOME OF HEAD OF HOUSEHOLD, RURAL/URBAN



We have also decided to use MCA as we find that responses tend to be non-linear. Ideally, of course, the simultaneous nature of the equation system (though much less so now that the income equations are dropped) could have been better represented. What is probably required is a technique that can handle polytomous variables using maximum likelihood methods. Although such techniques exist, they are quite new and we did not have the time to develop the required software.

Let us now look at the effects of our three main socio-economic variables, namely education, income and location upon our demographic variables. It should be stressed that the effects we are now observing are not bivariate, but multivariate adjusted.

Employment of the Respondent

Figure 1 shows the relationship between income of the head of household and employment of the respondent. It may be seen that as income levels of the head of household increase beyond the bounds of $60 and $230, the probability of employment falls by some 36 percentage points. Beyond that, they tend to fluctuate a bit, but remain essentially flat. This would seem to suggest that as income distribution improves, one would probably see a decline in the rate of female employment.

Conversely, figure 2 shows a generally positive relationship between own income and female employment. The significant income range is between $20-$205, after which the trend, though still positive is less sharp than before. This is reflective of the need for respondents, probably below the poverty line, to make ends meet. Incidentally, the weakness in the use of least squares shows up here, as the employment rates estimated go beyond one.

Having adjusted for income, the effects of education upon employment rates are small, and tend to be negative. The effect of the number of children surviving also tends to be small, and this is true of both the urban and rural areas.

Locational differentials in the rate of employment are significant. The employment rate of urban females is but half that of rural females, and the effect of YHH upon it is fairly homogenous as may be seen in figure 1.

FIGURE 2

EMPLOYMENT RATE OF RESPONDENT BY OWN INCOME, RURAL/URBAN

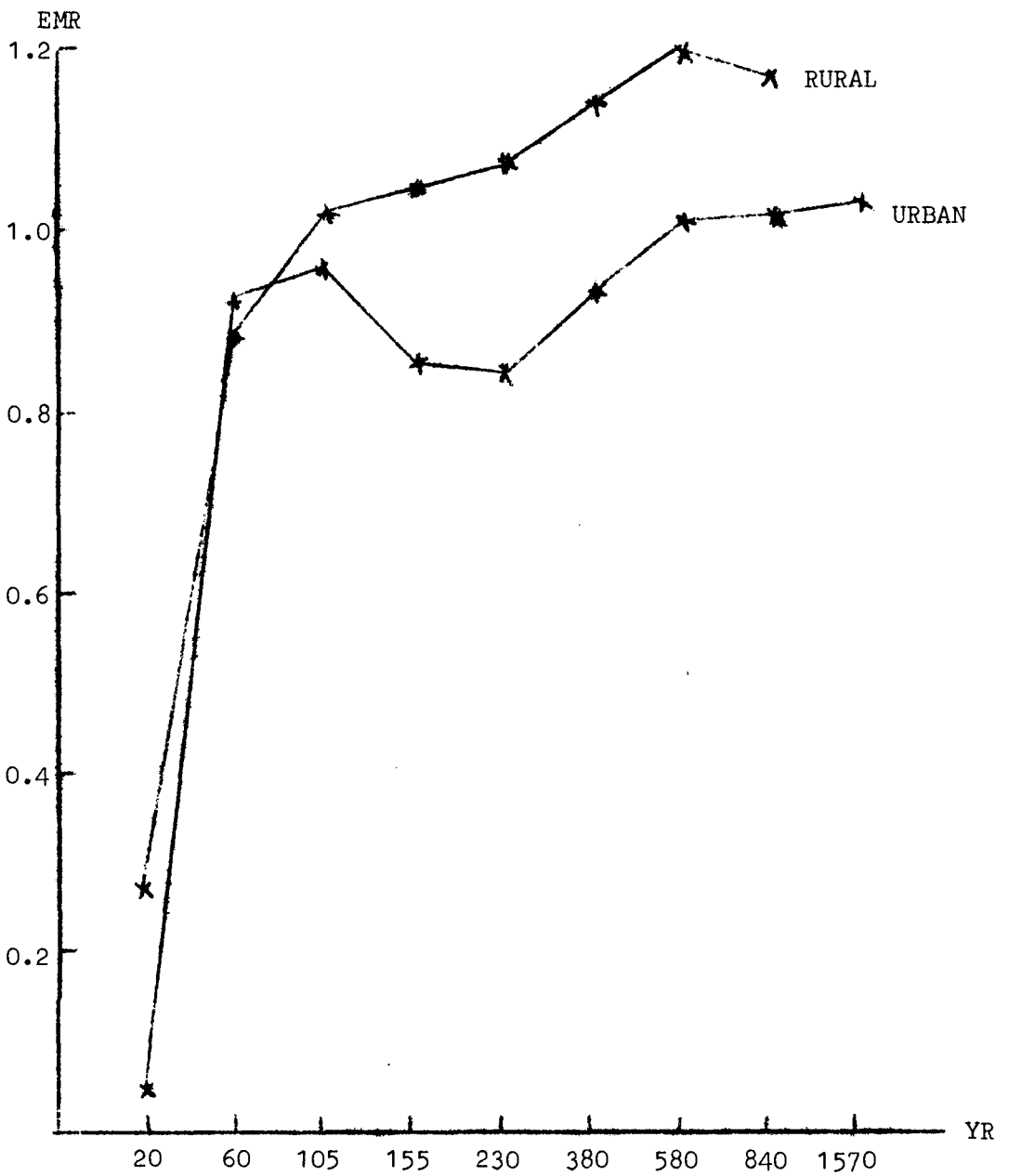
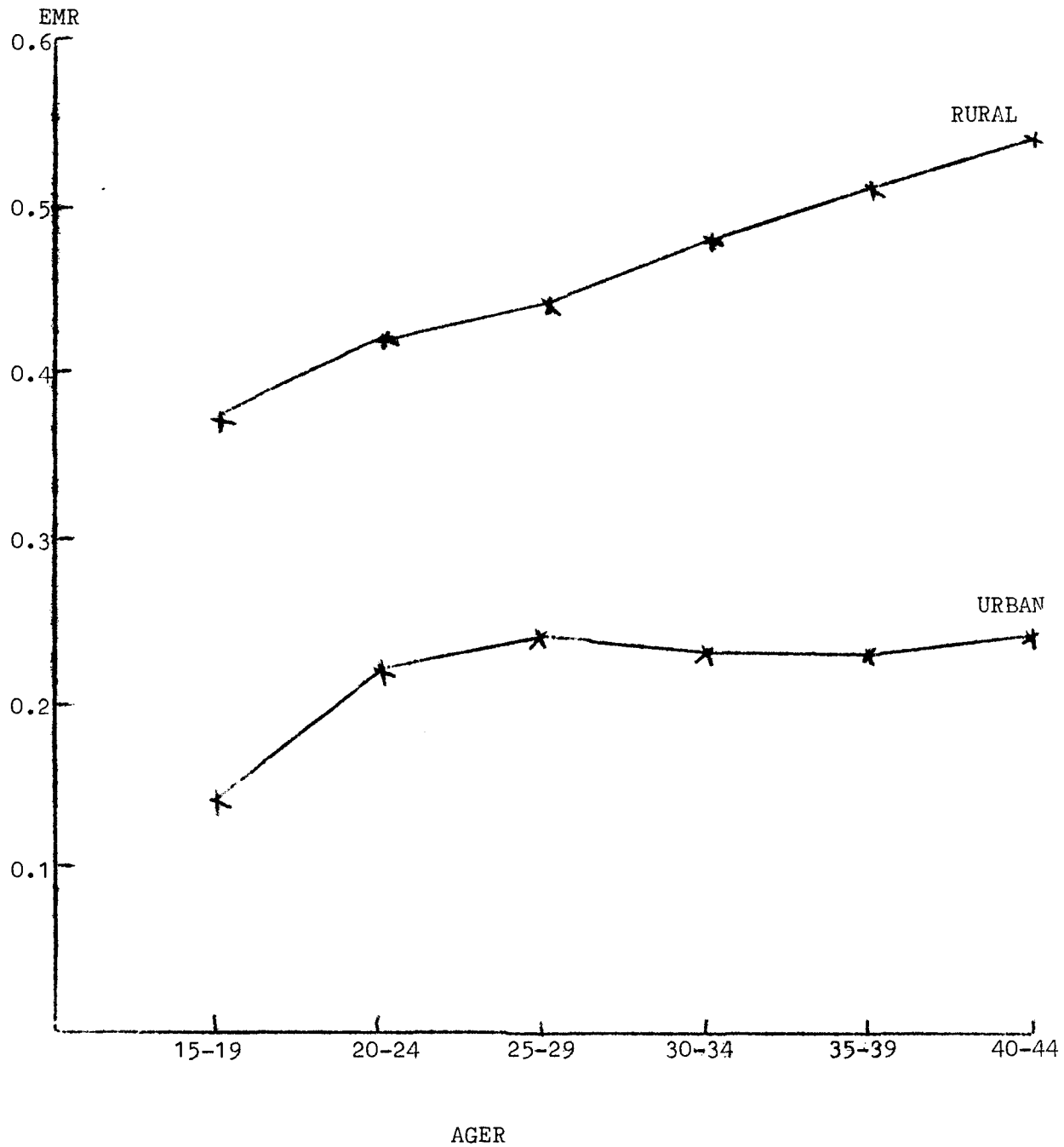


FIGURE 3

EMPLOYMENT OF RESPONDENT BY AGE, RURAL/URBAN



In summary, as development proceeds we are likely to observe, on balance, a decline in the rate of female employment. This is likely to be reinforced as rural-urban migration increases. Improved education for females will certainly increase their employability and market worth, although this effect may be less marked than the two preceding ones.

It would appear that number of children surviving has little influence on labour force participation and employment. Again, we should caution that we have not been able to control for the age of the children. If the age of a respondent is a proxy for the degree to which she has young children, as illustrated in figure 3, then the presence of young children is significant. What is baffling, though, is that while employment increases with age among rural females, it plateaus off after the age group 15-19. If age is indeed a proxy for the presence of young children, we would have expected the situation to be reversed, as one would expect that it is easier to combine a job with raising a family in rural areas. However, considering that we are measuring employment, and not labour force participation, the results established in figure 3 would seem to suggest women find it easier to be employed in rural rather than urban areas.

Number of Children Desired - Respondent

Since the number of children desired by the respondent is more closely correlated with the number of children surviving, we shall give more attention to the "demand side" as seen in the case of the female.

We see in figure 4 the effect of own income upon children desired. There appears to be a threshold at $280 in the case of rural households and $380 in urban households beyond which the number of children desired falls from what was essentially a plateau. This could be indicative of the fact that only women earning above a certain income level have to trade off between work and the quantity of children. It should also be noticed that the number of children desired is significantly higher in rural areas, as expected. However, the differential narrows beyond the threshold level.

FIGURE 4

NUMBER OF CHILDREN DESIRED BY RESPONDENT BY OWN INCOME

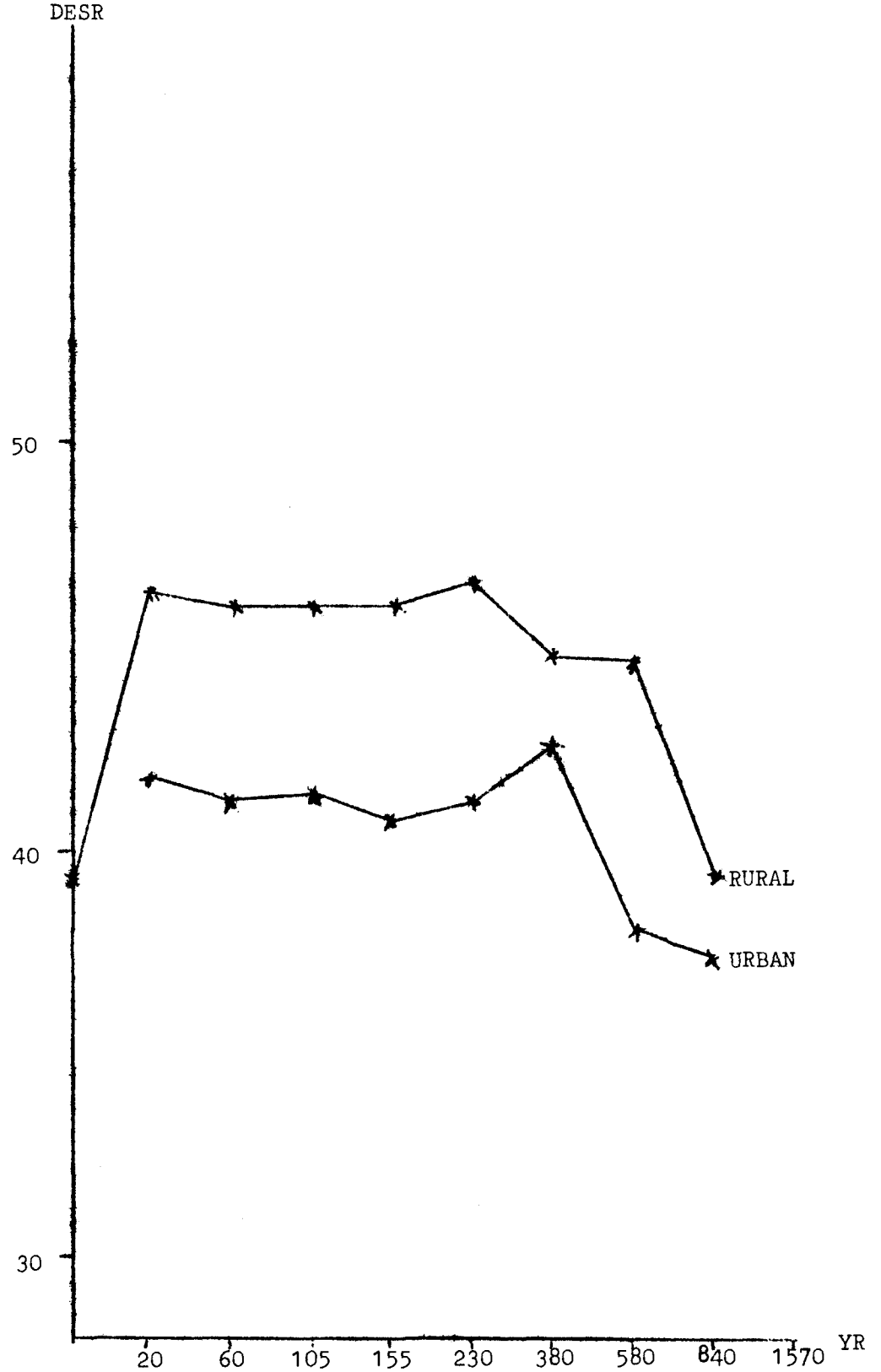


FIGURE 5

NUMBER OF CHILDREN DESIRED BY RESPONDENT BY INCOME OF HEAD OF HOUSEHOLD, RURAL/URBAN

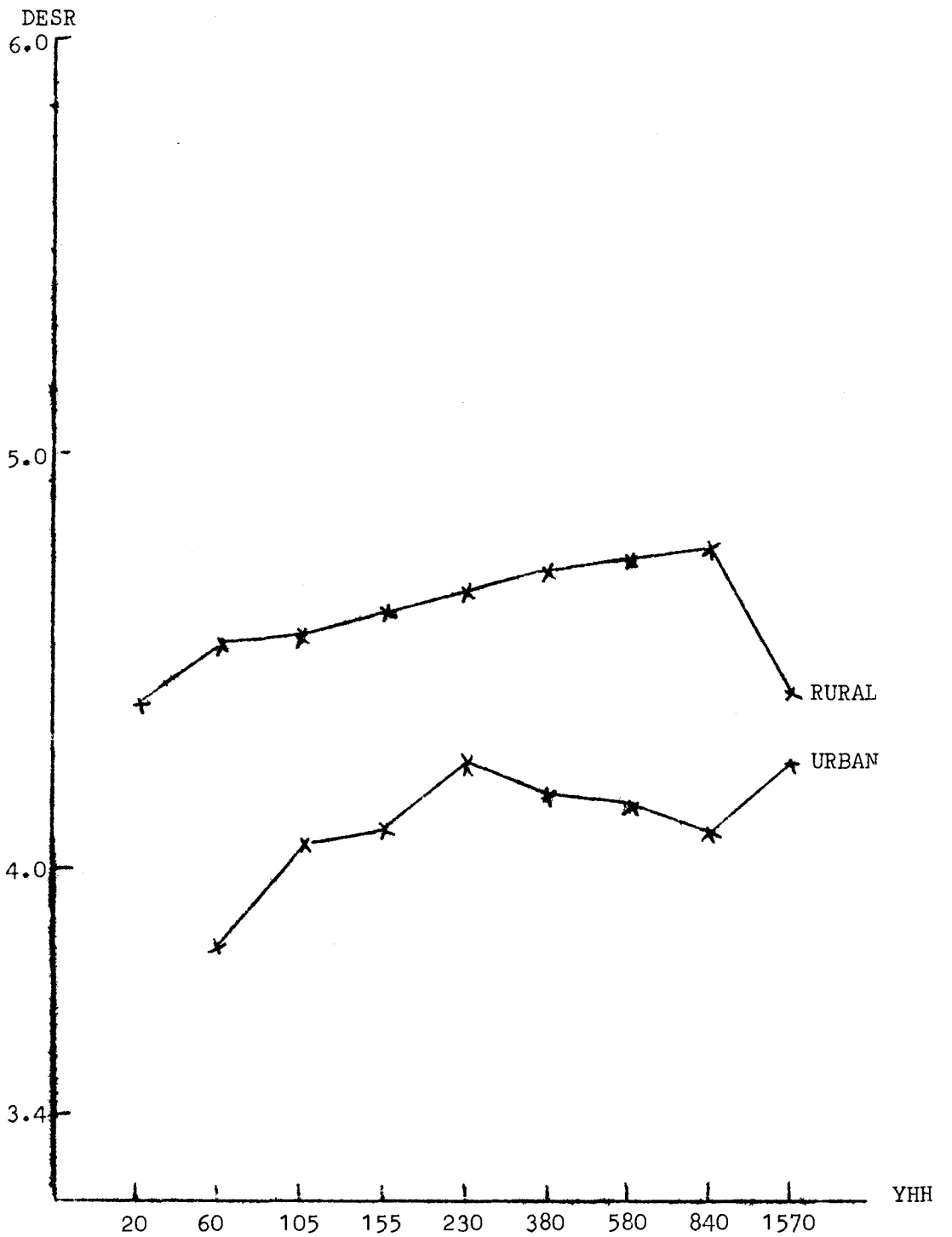


FIGURE 6

NUMBER OF CHILDREN DESIRED BY RESPONDENT BY EDUCATION, RURAL/URBAN

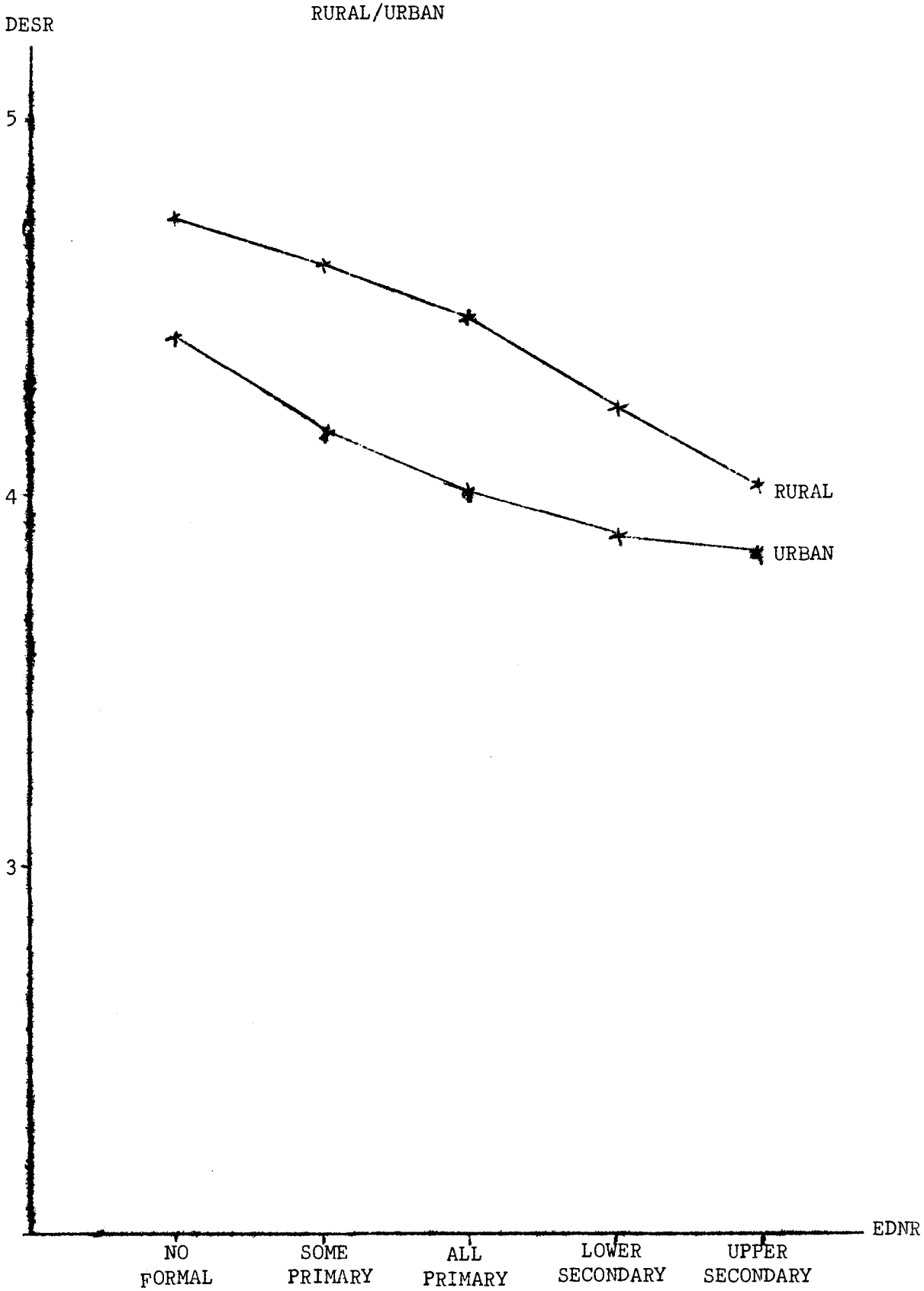


FIGURE 7

NUMBER OF CHILDREN DESIRED BY RESPONDENT BY AGE, RURAL/URBAN

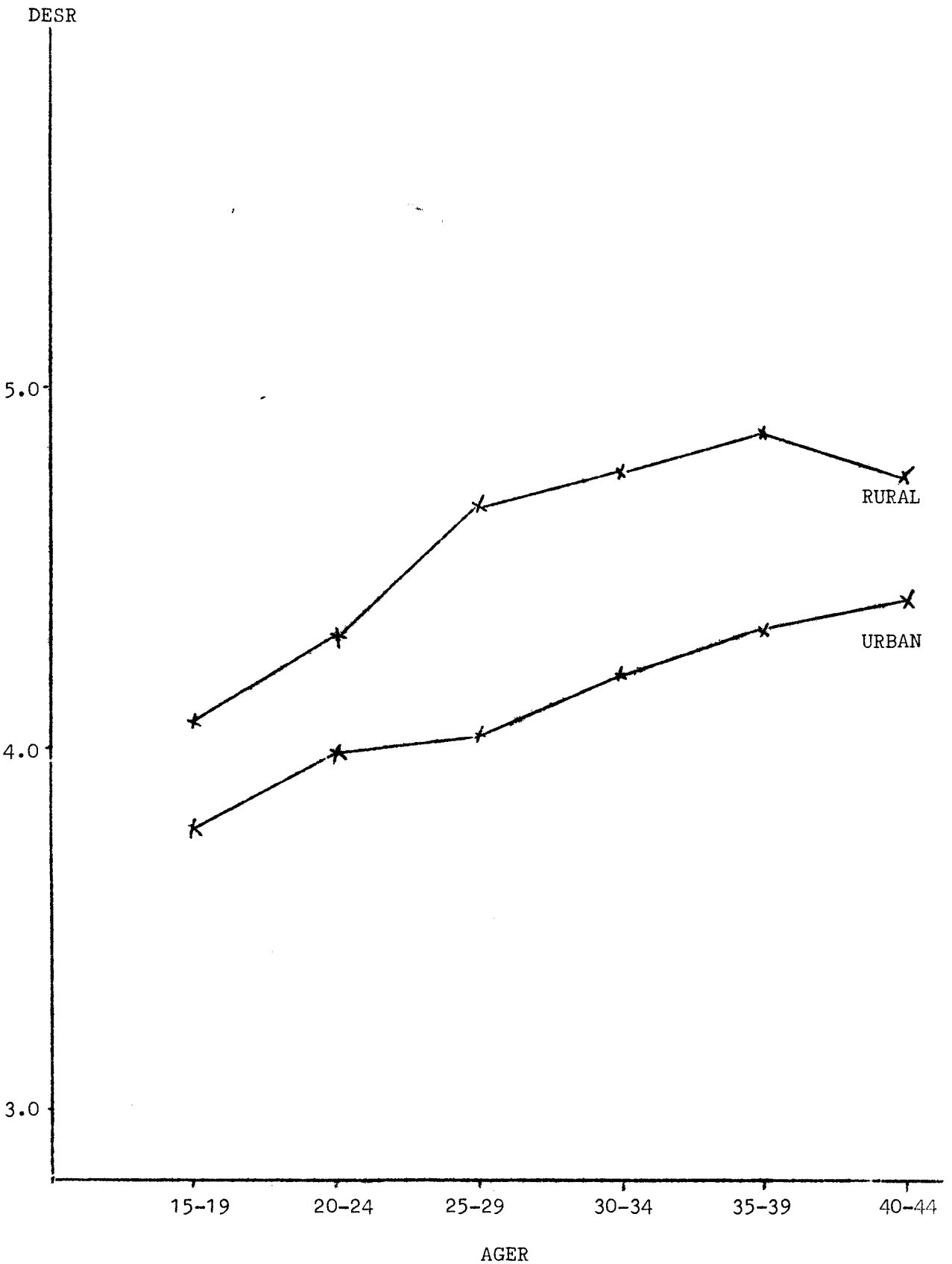


FIGURE 8

NUMBER OF CHILDREN DESIRED BY HEAD OF HOUSEHOLD BY OWN INCOME

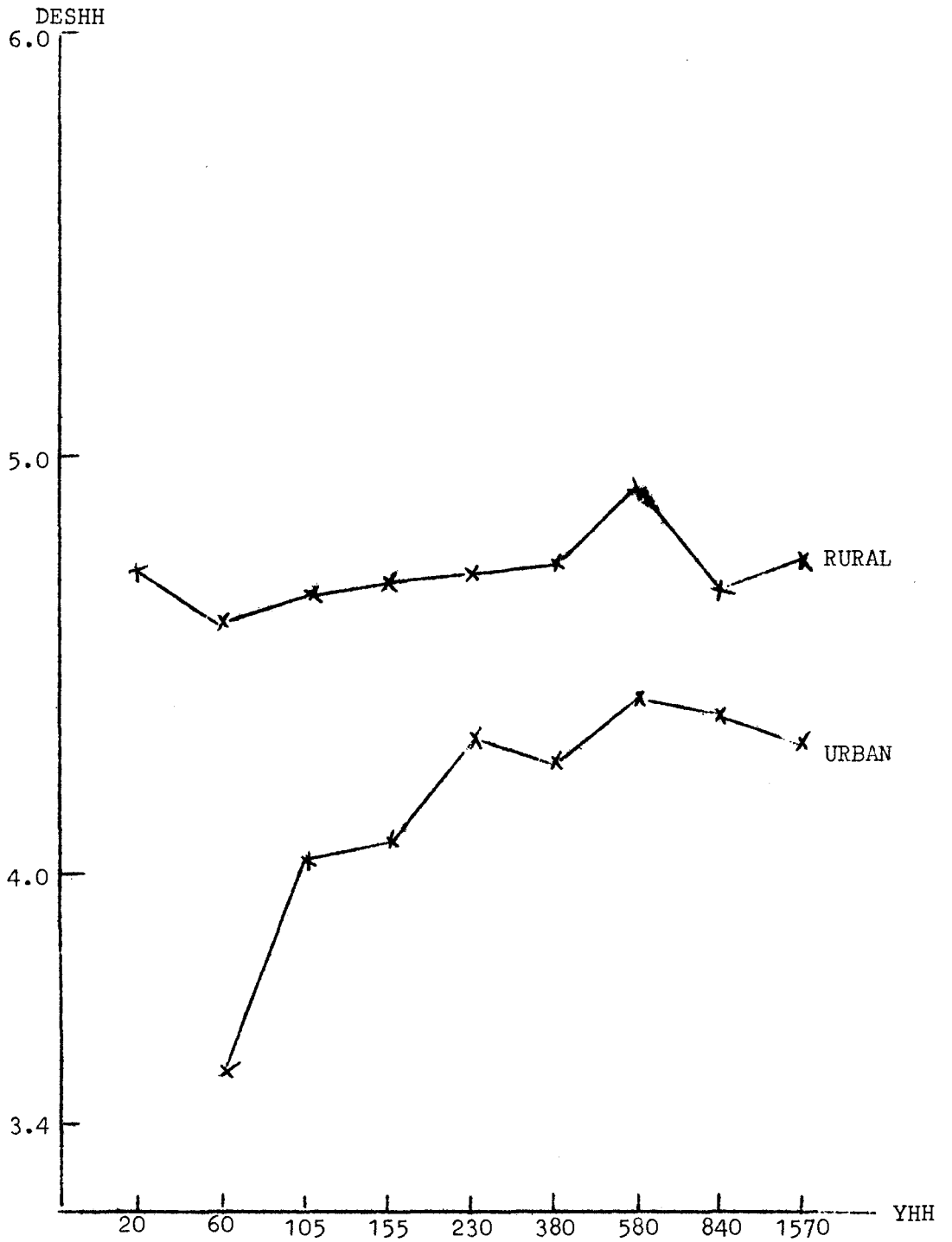


Figure 5 shows the effects of income of the head of household upon number of children desired by the respondent. The responses appear to be different in rural areas as compared to those in urban areas. In the former there is an almost linear relationship between YHH and DESR. In urban areas, the relationship increases between the income range $60 to $230, declines somewhat between $230 to $840 and increases again. At the highest income level, the differential is significantly reduced.

On the other hand, the effect of education (figure 6) is monotonically negative. Again the number of children desired in rural areas is higher, although the differential again diminished at higher levels of the education scale.

The effect of age in figure 7 is probably due to cohort differences in the number of children desired.

Altogether, the variables we have included explain just about 6% of the variance in the number of children desired. More work will be needed in order to capture a greater portion of the variance. In the meanwhile, it would appear that the effects of education are significant in bringing about a decline in the number of children desired while YR takes effect at higher levels of the variables.

Number of Children Desired - Head of Household

The responses of the number of children desired by the head of household to our main explanatory variables are similar to those of DESR with one exception.

Figure 8 shows the relationship between own income and the number of children desired. If we compare the pattern that exists among rural households against urban ones, we see that while the response for rural household heads is basically trendless, a quadratic relationship exists for urban households. The number of children desired peaks for the income group of $580 and then declines somewhat at higher income levels. This is perhaps suggestive of the greater awareness of the cost of having children in urban areas.

FIGURE 9

NUMBER OF CHILDREN SURVIVING BY NUMBER OF CHILDREN DESIRED BY RESPONDENT BY AGE

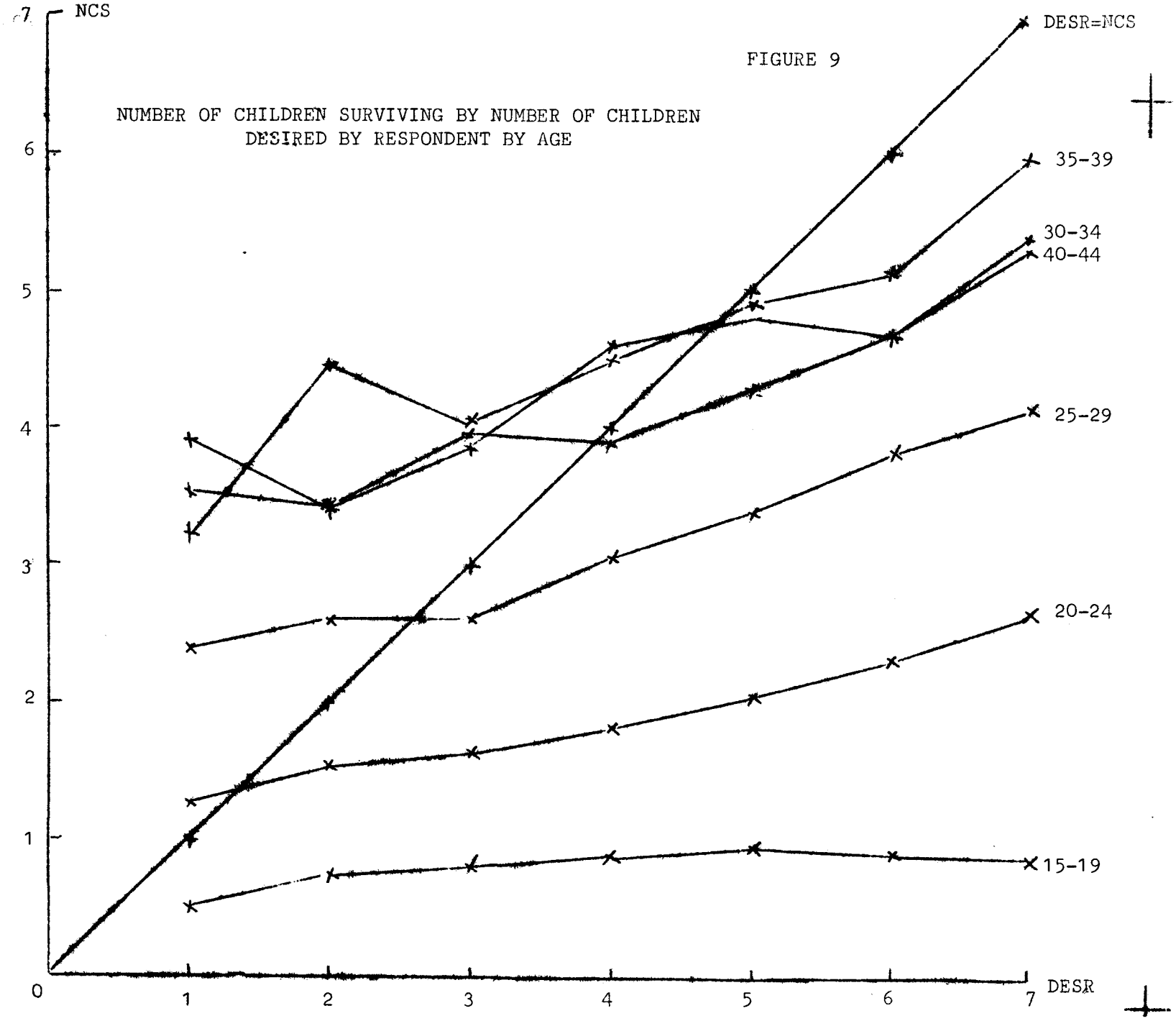


FIGURE 10

NUMBER OF CHILDREN SURVIVING BY INCOME OF HEAD OF HOUSEHOLD, RURAL/URBAN

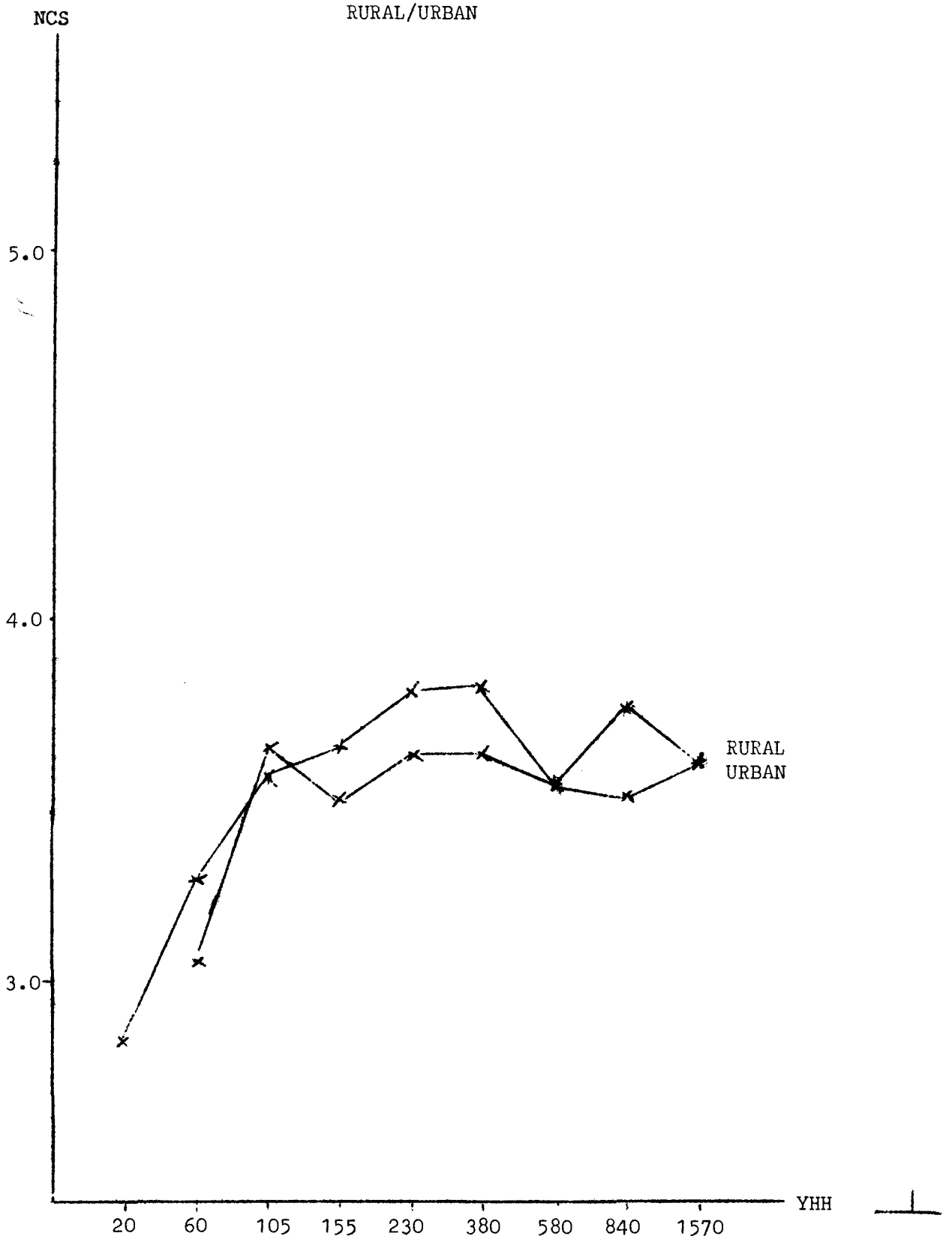


FIGURE 11

NUMBER OF CHILDREN SURVIVING BY EDUCATION OF RESPONDENT, RURAL/URBAN

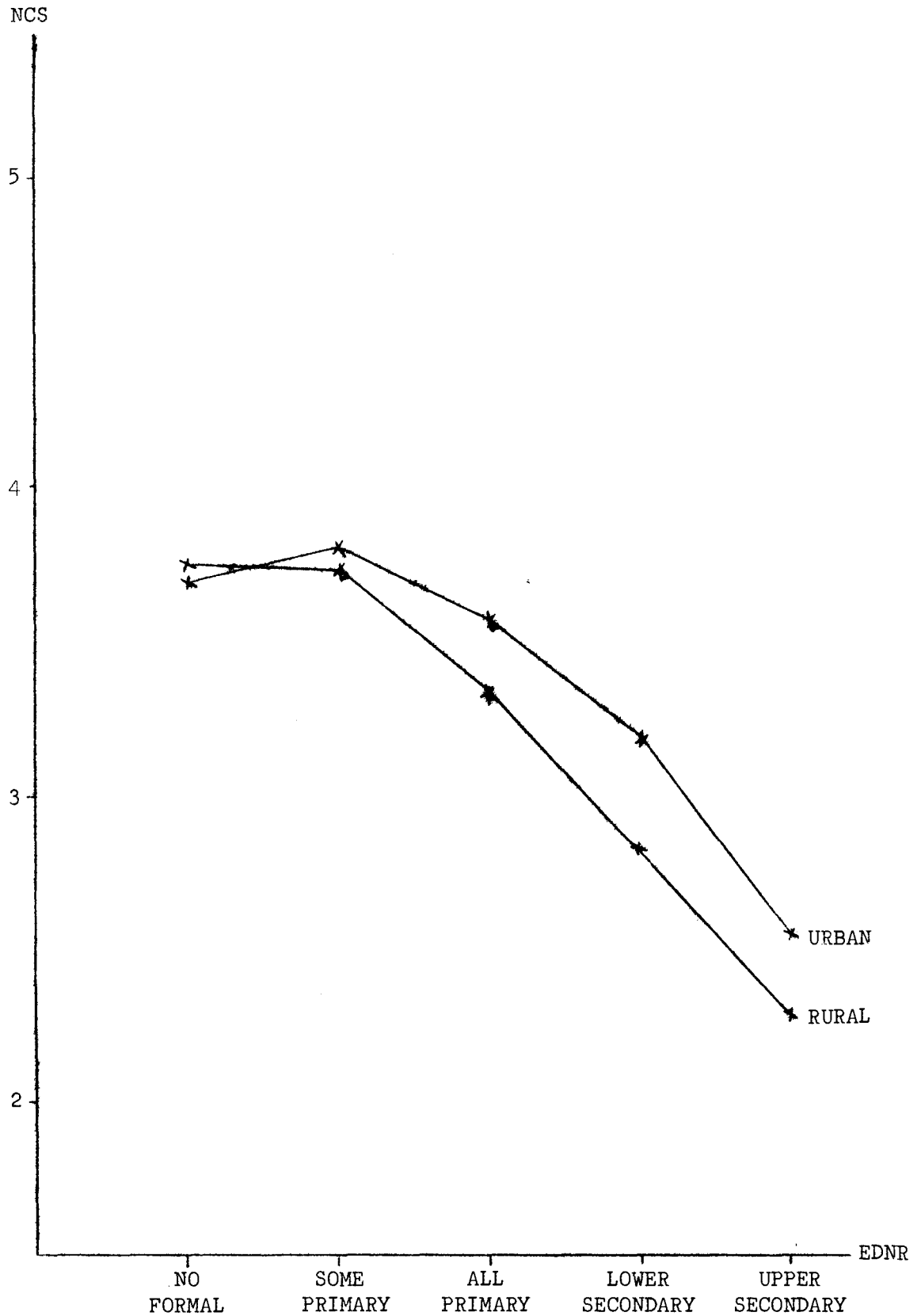
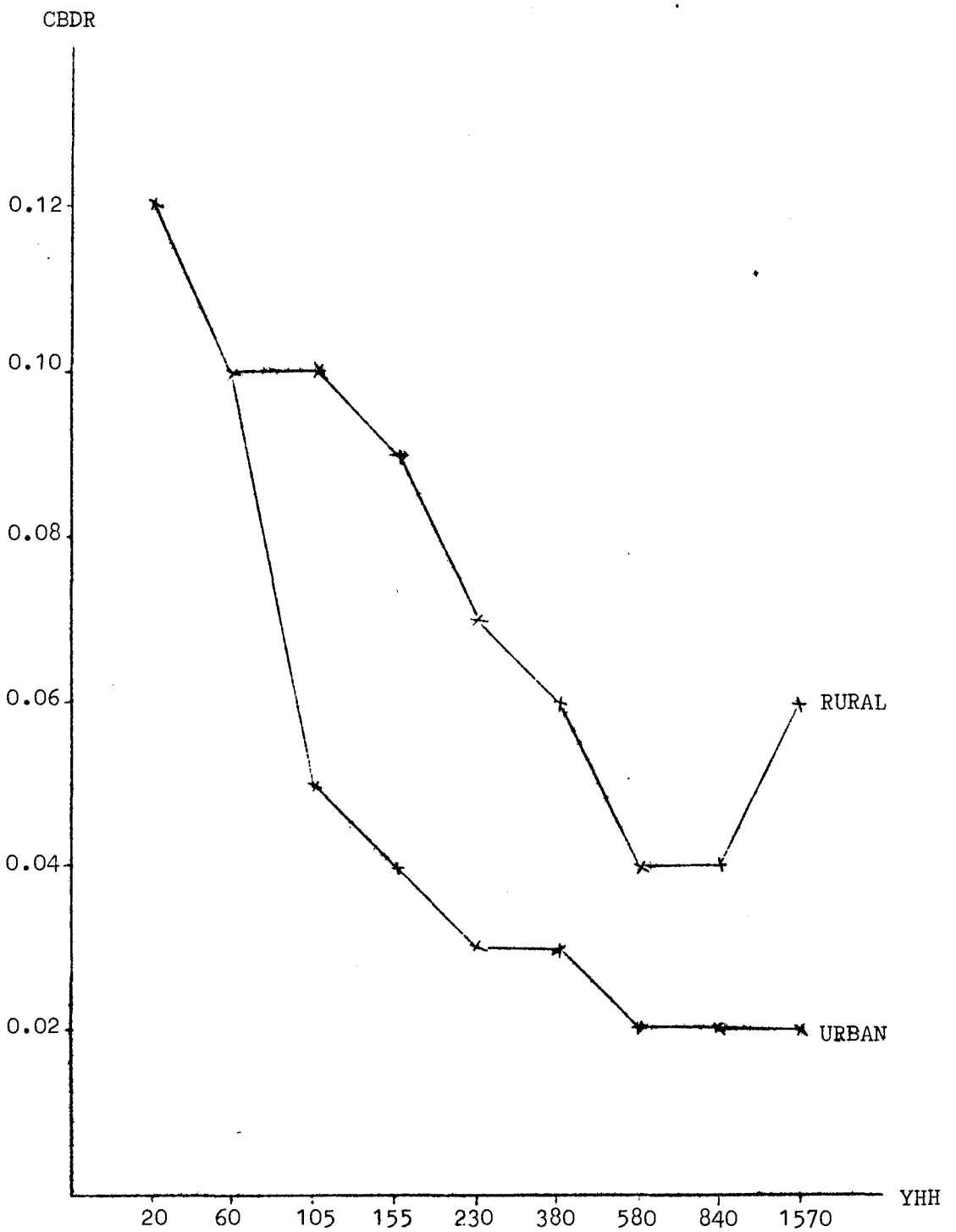


FIGURE 12

RATIO OF CHILDREN BORN AND NOW DEAD TO CHILDREN EVER BORN BY INCOME OF HEAD OF HOUSEHOLD, RURAL/URBAN



Number of Children Surviving

We turn next to examining the number of children surviving. There appears to be a strong relationship between the number of children desired and the number of children surviving. It has been suggested that this is the effect of post-hoc rationalization. In order to examine this in detail, MCA's for each age group, the results of which are illustrated in figure 9. If it is true that people tend to rationalize, we would expect the regressions for all age groups to be bunched together in approximation with the DESR=NCS line. This does not appear to be the case, at least not at the lower age groups anyway. The relative significance of DESR upon MCS underscores the need to better identify factors influencing DESR and thereby MCS.

Looking next at the influence of YHH upon NCS in figure 10, we again find two fairly distinct patterns for rural and urban areas. As rural incomes increase, there is a significant concommittent increase in the number of children surviving up to a threshold of $380. Then onwards, the response turns negative. In the case of urban households, the number of children rises sharply for incomes from $60 to $105 but tends to fluctuate between $\pm$ 0.1 for the rest of the income range.

The effect of education upon NCS is illustrated in figure 11. Although there is a differential between urban and rural responses, the differential is small and the relationship is fairly homogenous. Beyond the point where the respondent receives more than some primary education, there is a sharp linear decline in the number of children desired. The effect of education is thus seen to be much greater in magnitude than income.

We have not illustrated the effect of CBD upon NCS as it tends to be weak. The effect of ever-usage of contraceptives documents the tendency of high parity women to use contraceptives so that there is a negative relationship between contraceptive use and NCS.

Ratio of Children Born Alive (and now dead) to Children Ever Born

The relationship between our measure of childhood mortality and YHH documents a well known relationship between mortality and income levels. Mortality continues to decline as income increases until it flattens out at $580. There does not appear to be a threshold at a low income level below which mortality remains uniformly high. (See figure 12).

Another relationship which is not graphed is that between CBDR and children ever born. Although displaying a negative curvature, the relationship does not seem to hold when the sample is disaggregated into rural and urban subsamples.

Once incomes are controlled, education has a generally insignificant effect on mortality.

Conclusion

In this chapter, we have taken a look at some of the more interesting and important relationships between socio-economic variables and demographic ones. We have tended to concentrate on magnitudes rather than statistical significance, as these tend to be more interesting to the policy maker, and since statistical significance has been the preoccupation of previous chapters.

In looking at the impact of socio-economic variables on fertility behaviour, we see that income has an overall positive effect, except for female income, and then only at high levels. Thus, any policy that attempts to increase income levels, or attain a more equitable distribution of income, will tend to increase fertility at the same time. On the contrary, the evidence shows a significant decline in desired and achieved fertility with education. The effects of education are seen to be most significant on the "supply" side implying that more educated females have better access to, and make better use of contraceptives. The effects of education on "tastes" are significant but to a lesser extent.

This would suggest that we cannot expect improving income levels, or more egalitarian distributions of income to have an effect on reducing fertility. Indeed, without the influence of education, income improvement at around the "poverty line" level may be expected to have pronatalist effect.

To the extent that there are a considerable number of women who have more children than they desire, even before completing family formation, the access to affordable means of contraception will have to be enlarged both in urban and rural areas.

Although there are significant differentials in fertility, both desired and achieved, it cannot be expected that rural-urban migration will bring about fertility reductions. Indeed, if increasing income levels are expected, and all other factors remain constant, one can expect fertility to increase.

It may be rightly argued that migration will probably improve the access to, and therefore current usage of contraceptives, but it has been rather difficult to show the impact of contraception upon achieved fertility, within the framework of this study at least.

This bring us to the inevitable need for more research in this area. Even given the considerable sample size, and the number of variables covered in this study, it has not been possible to address all of the policy questions we started asking ourselves in Chapter I with certainty. In many instances, since the study followed the survey and did not give rise to it, this may be expected. It is possible that the data collected in the Malaysian Family and Fertility Survey of 1973 will be able to fill in the gaps left out by this study.

BIBLIOGRAPHY

Becker, G

"An Economic Analysis of Fertility" in National Bureau of Economic Research, Demographic and Economic Changes in Developed Countries, Princeton, 1960, pp. 209-240

Blake, J

"Are Babies Consumer Durables? Critique of the Economic Theory of Reproductive Motivation", PS 22, 1968, pp. 5-25

Carter, R A L

"Least Squares as an Explanatory Estimator", CJE 6(1), pp. 108-113, 1973

Chow, G C

"Tests of Equality Between Sets of Coefficients in Two Linear Regressions", Econometrica, Vol 28, 1960, pp. 591-605

Cho, L J and Retherford, R D

"Comparative Analysis Recent Fertility Trends in East Asia", IUSSP Liege 1973

Da Vanzo, J

The Determinants of Family Formation in Chile 1960: An Econometric Study of Female Labor Force Participation, Marriage, and Fertility Decisions, Santa Monica, 1972

Easterlin, R A

"Towards a Socio-Economic Theory of Fertility: A Survey of Research on Economic Factors in American Fertility" in Behrman, S J, Corsa, L A, and Freedman, R, Fertility and Family Planning: A World View, Ann Arbor, 1969

Encarnacion, J

Fertility and Labour Force Participation: Philippines 1968, Geneva 1974

Freedman, D S

"Consumption of Modern Goods and Services and Their Relation to Fertility: A Study in Taiwan" JDS (forthcoming)

Goldberger, A S

Econometric Theory, New York 1964

Gronau, R

"The Effect of Children on the Housewive's Value of Time" JPE 81(2) Part II 1973, pp. 5168-199

Harman, A J

"Fertility and Economic Behaviour of Families in the Philippines", Santa Monica, 1970, pp. 33

Heer, D M and Smith, D O

"Mortality Level, Desired Family Size and Population Increase", Demography, 5(1), 1968, pp. 104-121

Heise, D R

"Employing Nominal Variables, Induced Variables, and Block Variables in Path Analysis", Sociological Methods and Research 1(2) pp. 147-173, 1972

Johnston, J

Econometric Methods, 2nd edition, New York, 1972

Kutznets, S

"Population Trends and Modern Economic Growth-Notes Towards a Historical Perspective" (mimeo) 1973

Leibenstein, H

"An Interpretation of the Economic Theory of Fertility", JEL 12(2) 1974, pp. 457-479

Michael, R T

"Education in Nonmarket Production", JPE Vol 81(2) Pt I, pp. 306-327, 1973

Mincer, J

"Market Prices, Opportunity Cost and Income Effects" in Christ, C F, (ed), Measurement in Economics: Studies in Mathematics in Memory of Yahuda Grunfeld, Stanford, 1963, pp. 67-82

Mueller, E

"Economic Motives for Family Limitation" PS 27(3), 1972

Merlove, M and Press, S J

Univariate and Multivariate Log-Linear and Logistics Models, Santa Monica 1973

Pang, E F

Labour Force Growth, Utilization and Determinants in Singapore, Geneva 1975

Reynolds, H T

Making Causal Inference with Ordinal Data, Chapel Hill, 1971

Ridker, R G and Muscat, R J

"Incentives for Family Welfare and Fertility Reduction: An Illustration for Malaysia" SFP 4(1) 1973, pp. 1-10

Ryder, N B

"Comments" JPE 81(2) Part II, 1973, S 69

Schultz, T P

"An Economic Model of Family Planning and Fertility", JPE 77(2), 1969, pp. 153-180

- "An Economic Perspective on Population Growth" in National Academy of Sciences, Rapid Population Growth: Consequences and Policy Implications, Baltimore, 1971

Schultz, T W (ed)

New Approaches to Fertility Proceedings of a Conference June 8-9, 1972, JPE Vol 81(2) Part II, 1973

- Marriage, Family, Human Capital and Fertility, JPE Vol 82(2) Part II, 1974

Tabbarah, R B

"Towards a Theory of Demographic Development", EDCC, Vol 19, 1971, pp. 257-276

Tillis, R J

"A New Approach to the Economic Theory of Fertility Behaviour", JPE 81(2) Part II, 1973, pp. 514-564

RUMAH TANGGA

APPENDIX A

THE BASE MODEL

1.	YR	:	EMR, AGER, AGESOR, COM, STR, EDNR
2.	YHH	:	EMHH, AGEHH, AGESQHH, COM, STR, EDNHH
3.	YH	:	YHH, YR
4.	EMR	:	YHH, YH, YR, NCS, AGER, AGESQR, COM, STR, EDNR
5.	EMHH	:	YHH, NCS, AGEHH, AGESQHH, COM, STR, EDNHH
6.	DESR	:	YH, YHSQ, NCS, AGER, COM, STR, EDNR
7.	DESHH	:	YH, YHSQ, YHH, NCS, AGEHH, COM, STR, EDNHH
8.	NCS	:	DESR, DESHH, DESHHR, CBD, AGER, AGEHH, COM, STR, ATTFP, EDNR, EDNR, EDNHH
9.	CBD	:	YH, NCS, AGER, COM, STR, EDNR, EDNHH
10.	ACCESS	:	YH, EMR, AGER, COM, STR, ATTFP, EDNR, EDNHH
11.	USECRR	:	YH, EMR, ACESS, DIFFR, DIFFHH, AGER, AGERSQ, COM, STR, ATTFP, EDNR, EDNHH
12.	DIFFR	:	NCS - DESR
13.	DIFFHH	:	NCS - DESHH
14.	CEB	:	NCS - CBD

RUMAH TANGGA

APPENDIX B

ACCESS — Access to family planning; dummy variable, in response to the question, do you know where you can get family planning services now? Exogenous, predetermined.

AGEHH — Age of head of household; grouped data, group means used. For the open ended category, ages 45 and above, a mean age is calculated from the PES age distribution. Exogenous.

AGESQHH — Square of the age of household. Group means computed as above. Transformation.

AGER — Age of the respondent. Group means computed as in AGEHH. Exogenous.

AGESQR — Square of the age of respondent. Group means computed as above. Transformation.

ATTFP — Respondent's attitude towards family planning; four responses coded viz approve, depends, disapprove and indifferent. Three dummy variables are used. "Indifferent" is dropped to avoid the dummy variable trap. Exogenous.

CBD — The number of children born alive now dead. For the open ended category, a group mean is extrapolated, endogenous. Simultaneously determined.

CEB — Number of children ever born. Operationalized as in CBD. Identity.

COM — Community group of respondent. Four responses are coded - Malay, Chinese, Indian and others. Three dummies. Malays dropped. Exogenous.

DESHH — Number of children desired by the head of household. Answer in response to the question, "If .... you could have just the number of children you want, how many children would you want to have by the time you reach

the age of 45?" For the open ended category of seven and above, a group mean is found through extrapolation. Endogenous, simultaneously determined.

DESR — Number of children desired by the respondent. Operationalized in the same way as DESHH.

DIFFHH — NCS - DESHH. Identity.

EDNHH — Level of formal education of head of household. Six types of responses coded; no schooling, other forms of non-formal education, some years of primary education, all years of primary education, forms 1 to 3, forms 4 and above. The first two categories are combined, and the group is dropped. Hence, a group of four dummy variables are used. Exogenous.

EDNR — Level of formal education of the respondent. Operationalized as above. Exogenous.

EMHH — State of employment of head of household - employed/ unemployed. One dummy variable. Endogenous, simultaneously determined.

EMR — State of employment of the respondent - employed/ unemployed. One dummy variable. Endogenous, simultaneously determined.

NCS — Number of children surviving. Endogenous, simultaneously determined.

STR — Stratum of the respondent. Three responses coded: Metropolitan areas, towns and rural areas. A pair of dummy variables for the first two categories.

USECRR — Current use of contraceptives by the respondent. Yes/no dummy. Endogenous, simultaneously determined.

USENEVR — Never used contraceptives. Operationalized as above. Exogenous.

YH — Computed household income. Uses group means. The group mean of the open ended category is estimated by pareto's law. Endogenous, simultaneously determined.

YHH	Computed income of head of household. Group means computed as above. Endogenous, simultaneously determined.
YHHSQ	Square of the computed income of head of household. Group means computed as above. Transformation.
YR	Computed income of the respondent. Group means computed as above. Endogenous, simultaneously determined.
YRSQ	Square of the computed income of the respondent. Group means computed as above. Transformation.

RUMAH TANGGA

TABLE 3.1
AGE DISTRIBUTIONS

HEADS OF HOUSEHOLDS AND RESPONDENTS

	AGEHH	AGER
15 - 19	0.2	4.6
20 - 24	4.6	16.9
25 - 29	14.0	21.7
30 - 34	20.0	23.0
35 - 39	17.7	18.6
40 - 44	16.2	15.0
45+	27.3	0.0

TABLE 3.2
AGE DISTRIBUTIONS

HEADS OF HOUSEHOLDS AND RESPONDENTS

	EDNHH	EDNR
No formal education	17.7	40.8
Some primary	39.9	36.4
All primary	27.0	15.2
Lower secondary	7.7	4.5
Upper secondary	7.6	3.1

RUMAH TANGGA

INCOME DISTRIBUTION

HEADS OF HOUSEHOLDS AND RESPONDENTS

	YHH	YR
0	0.0	0.1
20	1.2	74.2
20	11.4	8.2
105	18.1	6.9
155	17.6	6.6
230	22.7	1.1
380	17.6	1.4
580	5.9	1.4
840	3.8	0.2
1570	1.7	0.0

TABLE 3.4

NUMBER OF CHILDREN DESIRED

HEADS OF HOUSEHOLDS AND RESPONDENTS

	DESHH	DESR
0	1.2	0.8
1	0.6	8.5
2	7.2	8.5
3	11.2	9.9
4	31.2	36.2
5	20.2	19.7
6	14.6	14.9
7+	13.9	10.1

RUMAH TANGGA

TABLE 3.5

CHILDREN SURVIVING AND CHILDREN BORN DEAD

RESPONDENTS

	NCS	CBD
0	6.4	78.9
1	12.3	12.7
2	15.4	4.9
3	15.4	2.1
4	15.0	0.8
5	12.8	9.3
6	11.4	0.1
7+	11.3	0.1

RUMAH TANGGA

APPENDIX D : TABLE 4.1

SUB GROUP MEANS AND MCA

	Dependent Variable		EMR		
	Independent Variables		YR, AGER, EDNR, STR		
	Covariates				
	Grand Mean		54.30		
(1)	(2)	(3)	(4)	(5)	(6)
EMR	Unemployed	22.45	-31.76	-32.29	-32.52
EMR	Employed	100.55	46.25	47.01	47.35
AGER	15 - 19	35.72	-18.58	-12.2	-9.83
	20 - 24	50.60	-3.70	-6.32	-5.85
	25 - 29	58.15	3.85	-0.21	-0.23
	30 - 34	60.70	6.39	4.85	4.74
	35 - 39	55.82	1.52	4.22	3.29
	40 - 44	47.21	-7.10	-1.29	-1.28
EDNR	No formal education	43.84	-10.47	-18.47	-18.09
	Some Primary	43.65	-10.65	-6.72	-7.41
	All Primary	44.59	-9.35	3.83	5.77
	Lower Secondary	103.52	49.52	57.67	55.30
	Upper Secondary	292.73	238.42	220.54	217.43
STR	Rural	50.80	-3.50	-3.56	-1.64
	Metro Towns	66.45	12.15	11.27	4.26
	Towns	62.99	8.69	10.07	5.65

(1) Variable

(2) Cateory

(3) Subgroup mean

(4) Unadjusted deviation FR Grand mean

(5) Adjusted for independent variables

(6) Adjusted for independent variables and covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.2

SUBGROUP MEANS AND MCA

Dependent Variable	YHH
Independent Variables	EMHH, AGEHH, EDNHH, STR
Covariates	COM
Grand Mean	265.84

(1)	(2)	(3)	(4)	(5)	(6)
EMHH	Unemployed	370.86	105.02	51.81	38.07
	Employed	262.46	-3.38	-1.67	-1.23
AGEHH	15 - 19	157.50	-108.34	-121.79	-105.84
	20 - 24	169.26	-96.58	-101.32	-88.77
	25 - 29	241.78	-24.05	-56.27	-50.36
	30 - 34	258.75	-7.09	-32.31	-30.84
	35 - 39	271.55	5.71	2.51	-1.38
	40 - 44	265.04	-0.80	14.24	12.77
	45+	297.11	31.27	60.26	57.33
EDNHH	No formal education	186.98	-78.66	-94.31	-85.74
	Some Primary	222.90	-42.95	-38.58	-45.39
	All Primary	242.92	-22.92	-13.15	-2.09
	Lower Secondary	370.84	105.05	98.14	86.19
	Upper Secondary	649.76	383.92	370.61	357.90
STR	Rural	272.32	-43.52	--26.88	-15.38
	Metro Towns	432.23	166.39	105.23	67.08
	Towns	356.14	90.30	52.97	22.50

(1) Variable
(2) Category
(3) Subgroup Mean
(4) Unadjusted Deviation FR Grand Mean
(5) Adjusted for Independent Variables
(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.3

SUBGROUP MEANS AND MCA

Dependent Variable	YH
Independent Variables	YHH, YR
Covariates	NONE
Grand Mean	316.98

(1)	(2)	(3)	(4)	(5)	(6)
YHH	0	20	-296.98	-327.68	
	20	60.38	-256.60	-282.06	
	60	100.48	-216.50	-238.99	
	105	144.66	-172.32	-191.72	
	155	203.32	-113.60	-123.37	
	230	302.19	-14.79	-3.43	
	380	456.78	139.80	148.05	
	580	610.16	293.18	310.37	
	840	1013.77	696.79	731.59	
	1570	1112.20	795.22	893.82	
YR	0	216.92	100.06	47.79	
	20	323.95	12.97	29.83	
	60	188.84	-128.14	-6.39	
	105	225.50	-91.48	-73.64	
	155	247.49	-69.49	-142.57	
	230	322.82	5.84	-165.64	
	380	624.36	307.38	-155.52	
	580	816.22	499.24	-201.34	
	840	747.36	430.37	-375.72	
	1570	1570	253.02	359.20	

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation FR Grand Mean

(5) Adjusted for Independent Variables

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.4

SUBGROUP MEANS AND MCA

Dependent Variable	EMR
Independent Variables	YHH, YR, NCS, EDNR, STR
Covariates	AGER, COM
Grand Mean	0.41

(1)	(2)	(3)	(4)	(5)	(6)
YR	0	1.00	0.59	0.47	0.48
	20	0.22	-0.19	-0.18	-0.18
	60	0.96	0.56	0.46	0.44
	105	0.97	0.56	0.52	0.54
	155	0.91	0.51	0.51	0.54
	230	0.91	0.51	0.56	0.57
	380	0.95	0.54	0.67	0.65
	580	1.00	0.59	0.76	0.74
	840	1.00	0.59	0.76	0.74
	1570	1.00	0.59	0.81	0.79
YR	0	1.00	0.59	-0.04	-0.02
	20	0.51	0.11	-0.06	-0.04
	60	0.69	0.08	0.12	0.11
	105	0.60	0.20	0.16	0.15
	155	0.53	0.12	0.06	0.06
	230	0.37	-0.04	-0.04	-0.04
	380	0.26	-0.15	-0.09	-0.09
	580	0.25	-0.15	-0.07	-0.07
	800	0.28	-0.13	-0.08	-0.09
	1570	0.27	-0.14	-0.09	-0.09
NCS	0	0.38	-0.03	-0.03	-0.00
	1	0.39	-0.02	-0.01	0.01
	2	0.38	-0.03	-0.01	0.01
	3	0.41	0.00	0.00	0.00
	4	0.43	0.02	0.01	0.00

APPENDIX D : TABLE 4.4

(1)	(2)	(3)	(4)	(5)	(6)
	5	0.44	0.04	0.01	0.00
	6	0.43	0.02	0.01	-0.01
	7	0.40	-0.01	0.00	-0.02
EDNR	No formal education	0.51	0.10	0.06	0.05
	Some Primary	0.36	-0.05	-0.03	-0.02
	All Primary	0.27	-0.14	-0.06	-0.06
	Lower Secondary	0.28	-0.13	-0.07	-0.05
	Upper Secondary	0.58	0.17	-0.04	-0.02
STR	Rural	0.47	0.06	0.03	0.03
	Metro Towns	0.19	-0.22	-0.10	-0.09
	Towns	0.27	-0.14	-0.08	-0.07

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variables

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.5

SUBGROUP MEANS AND MCA

Dependent Variable	EMHH
Independent Variables	YHH, NCS, EDNHH, STR
Covariates	AGEHH, COM
Grand Mean	0.97

(1)	(2)	(3)	(4)	(5)	(6)
YHH	0	1.00	0.03	0.03	-0.00
	20	0.96	-0.01	0.00	-0.02
	60	0.97	0.00	0.01	-0.00
	105	0.98	0.01	0.02	0.00
	155	0.98	0.01	0.01	0.00
	230	0.97	0.00	0.00	0.00
	380	0.96	-0.01	-0.01	0.00
	580	0.94	-0.03	-0.04	-0.02
	1570	0.90	-0.07	-0.08	-0.05
NCS	0	0.96	-0.01	-0.01	-0.02
	1	0.96	-0.01	-0.01	-0.02
	2	0.97	0.00	0.00	-0.01
	3	0.96	-0.01	-0.01	-0.01
	4	0.97	0.00	0.00	0.00
	5	0.97	0.00	0.00	0.01
	6	0.98	0.01	0.01	0.02
	7	0.97	0.00	0.01	0.03
EDNHH	No formal education	0.94	-0.03	-0.03	-0.01
	Some Primary	0.98	0.01	0.00	0.00
	All Primary	0.98	0.01	0.01	0.00
	Lower Secondary	0.96	-0.01	0.00	-0.01
	Upper Secondary	0.97	0.00	0.03	0.01
STR	Rural	0.97	0.00	0.00	0.00
	Metro Towns	0.96	-0.01	-0.01	-0.00
	Towns	0.95	-0.02	-0.01	-0.01

(1) Variable
(2) Category
(3) Subgroup Mean
(4) Unadjusted Deviation from Grand Mean
(5) Adjusted for Independent Variables
(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.6

SUBGROUP MEANS AND MCA

Dependent Variable	DESR
Independent Variables	YH, YR, NCS, EDNR, STR
Covariates	AGER, COM
Grand Mean	4.50

(1)	(2)	(3)	(4)	(5)	(6)	
YH	0	5.00	0.50	-0.08	0.16	
	20	4.35	-0.15	-0.06	0.08	
	60	4.46	-0.05	-0.01	-0.08	
	105	4.67	0.16	0.16	0.07	
	155	4.55	0.05	-0.01	-0.03	
	230	4.41	-0.09	-0.11	-0.00	
	380	4.50	-0.01	-0.02	0.00	
	580	4.40	-0.10	-0.05	-0.02	
	840	4.18	-0.33	-0.18	-0.08	
	1570	4.07	-1.44	-0.19	-0.09	
YR	0	4.00	-0.50	-0.54	-0.57	
	20	4.52	0.02	0.03	0.01	
	60	4.70	0.20	0.03	-0.02	
	105	4.50	-0.01	-0.14	-0.02	
	155	4.39	-0.12	-0.19	0.02	
	230	4.41		-0.09	-0.11	-0.00
	380	4.11	-0.39	0.06	0.02	
	580	3.68	-0.82	-0.05	-0.11	
	840	3.41	-1.03	-0.34	-0.34	
	1570	2.00	-2.50	-1.51	-1.55	
NCS	0	3.80	-0.70	-0.67	-0.75	
	1	3.80	-0.70	-0.68	-0.73	
	2	3.98	-0.52	-0.49	-0.52	
	3	4.40	-0.11	-0.11	-0.14	
	4	4.66	0.16	0.13	0.14	
	5	4.92	0.42	0.39	0.43	

APPENDIX D : TABLE 4.6

(1)	(2)	(3)	(4)	(5)	(7)
	6	5.14	0.64	0.62	0.66
	7	5.18	0.68	0.70	0.78
EDNR	No formal education	4.74	0.24	0.07	0.09
	Some Primary	4.48	-0.02	-0.03	-0.03
	All Primary	4.26	-0.24	-0.03	-0.10
	Lower Secondary	3.90	-0.61	-0.18	-0.15
	Upper Secondary	3.66	-0.84	-0.15	-0.11
STR	Rural	4.62	0.11	0.09	0.07
	Metro Towns	4.01	-0.49	-0.58	-0.26
	Towns	4.32	-0.18	-0.16	-0.12

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variables

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.7

SUBGROUP MEANS AND MCA

Dependent Variable	DESHH
Independent Variables	YH, YHH, NCS, EDNHH, STR
Covariates	AGEHH, COM
Grand Mean	4.59

(1)	(2)	(3)	(4)	(5)	(6)
YH	0	3.50	-1.09	01.66	-1.32
	20	4.09	-0.50	-0.54	-0.37
	60	4.67	0.08	-0.11	-0.13
	105	4.77	0.19	0.18	0.16
	155	4.69	0.11	0.02	0.10
	230	4.60	0.01	0.02	0.06
	380	4.51	-0.07	-0.02	-0.09
	580	4.45	-0.14	-0.03	-0.12
	840	4.40	-0.20	-0.18	-0.23
	1570	4.15	-0.43	-0.29	-0.36
YHH	0	5.00	0.41	0.95	0.97
	20	4.76	0.17	0.36	0.27
	60	4.70	0.12	-0.05	-0.17
	105	4.73	0.14	0.04	-0.11
	155	4.60	0.01	-0.05	-0.08
	230	4.57	-0.02	-0.05	0.04
	380	4.50	-0.09	-0.05	0.05
	580	4.55	-0.04	0.22	0.29
	840	4.30	-0.28	0.17	0.26
	1570	4.13	-0.46	0.22	0.32
NCS	0	4.13	-0.46	-0.46	-0.47
	1	4.00	-0.59	-0.57	-0.57
	2	4.13	-0.46	-0.43	-0.43
	3	4.52	-0.07	-0.08	-0.09
	4	4.69	0.11	0.08	0.08
	5	4.90	0.31	0.29	0.30

APPENDIX D : TABLE 4.7

(1)	(2)	(3)	(4)	(5)	(6)
	6	5.14	0.55	0.54	0.53
	7	5.15	0.57	0.59	0.61
EDNHH	No formal education	4.85	0.26	0.19	0.15
	Some Primary	4.64	0.05	-0.02	0.01
	All Primary	4.64	0.05	0.05	-0.02
	Lower Secondary	4.09	-0.49	-0.28	-0.17
	Upper Secondary	4.01	-0.58	-0.24	-0.18
STR	Rural	4.70	0.11	0.08	0.06
	Metro Towns	4.07	-0.51	-0.38	-0.26
	Towns	4.45	-0.14	-0.10	-0.07

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variables

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.8

SUBGROUP MEANS AND MCA

Dependent Variable		NCS			
Independent Variables		DESR, DESHH, EDNR, EDNHH, STR			
Covariates		AGER, AGEHH, COM			
Grand Mean		3.61			
(1)	(2)	(3)	(4)	(5)	(6)
DESR	1	2.45	-1.16	-0.98	-1.02
	2	2.48	-1.13	-0.80	-0.70
	3	2.78	-0.83	-0.66	-0.57
	4	3.28	-0.33	-0.22	-0.19
	5	3.76	0.15	0.07	0.12
	6	4.42	0.81	0.62	0.54
	7	5.16	1.55	1.14	0.91
DESHH	0	3.88	0.27	0.23	0.21
	1	2.68	-0.93	-0.51	-0.70
	2	2.56	-1.04	-0.56	-0.59
	3	2.94	-0.67	-0.47	-0.45
	4	3.28	-0.33	-0.16	-0.17
	5	3.76	0.15	0.10	0.11
	6	4.20	0.59	0.39	0.42
	7	4.61	1.00	0.48	0.46
EDNR	No formal education	4.13	0.52	0.44	0.07
	Some Primary	3.67	0.06	0.04	0.13
	All Primary	2.80	-0.80	-0.70	-0.15
	Lower Secondary	2.40	-1.20	-0.95	-0.47
	Upper Secondary	1.75	-1.86	-1.49	-1.02
EDNHH	No formal education	3.68	0.07	-0.30	-0.28
	Some Primary	3.88	0.27	0.11	0.12
	All Primary	3.61	0.00	0.05	0.08
	Lower Secondary	3.13	-0.47	0.02	0.01
	Upper Secondary	2.52	-1.09	-0.04	-0.24

(1)	(2)	(3)	(4)	(5)	(6)
STR	Rural	0.43	0.01	-0.11	-0.01
	Metro Towns	0.12	-0.14	0937	0.02
	Towns	0.18	0.10	0.30	0.07

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variables

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.9

SUBGROUP MEANS AND MCA

Dependent Variable			CBD		
Independent Variables			YH, NCS, EDNR, EDNHH, STR		
Covariates			AGER, COM		
Grand Mean			0.36		
(1)	(2)	(3)	(4)	(5)	(6)
YH	0	0.0	-0.36	-0.50	-0.56
	20	0.38	0.03	0.00	0.01
	60	0.61	0.25	0.13	0.07
	105	0.47	0.11	-0.00	-0.05
	155	0.49	0.14	0.17	0.05
	230	0.36	0.00	-0.01	0.01
	380	0.27	-0.09	-0.03	0.00
	580	0.17	-0.19	-0.06	-0.04
	840	0.11	-0.24	-0.05	-0.09
	1570	-0.10	-0.25	-0.03	-0.04
NCS	0	0.27	-0.09	-0.02	0.23
	1	0.22	-0.14	-0.09	-0.09
	2	0.27	-0.09	-0.05	0.07
	3	0.45	0.10	0.10	0.13
	4	0.56	0.21	0.18	0.14
	5	0.55	0.19	0.15	0.05
	6	0.41	0.05	0.01	-0.15
	7	0.00	-0.36	-0.39	-0.58
EDNR	No formal education	0.53	0.17	0.13	0.05
	Some Primary	0.31	-0.04	-0.04	-0.00
	All Primary	0.16	-0.19	-0.17	-0.09
	Lower Secondary	0.06	-0.29	-0.17	-0.08
	Upper Secondary	0.20	-0.34	-0.14	-0.19

(1)	(2)	(3)	(4)	(5)	(6)
EDNHH	No formal education	0.55	0.19	0.08	0.05
	Some Primary	0.38	0.03	-0.01	0.02
	All Primary	0.35	-0.01	0.01	-0.02
	Lower Secondary	0.12	-0.23	-0.09	-0.06
	Upper Secondary	0.04	-0.32	-0.10	-0.13
STR	Rural	3.62	0.07	0.04	0.03
	Metro Towns	3.47	-0.24	-0.13	-0.11
	Towns	3.71	-0.18	-0.11	-0.09

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variable

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.10

SUBGROUP MEANS AND MCA

Dependent Variable	ACESS
Independent Variables	YH, EMR, EDNR, EDNHH, STR
Covariates	AGER, COM
Grand Mean	0.69

(1)	(2)	(3)	(4)	(5)	(6)
YH	0	0.50	-0.19	-0.16	-0.16
	20	0.61	-0.08	-0.04	-0.03
	60	0.50	-0.19	-0.13	-0.14
	105	0.57	-0.12	-0.08	-0.09
	155	0.67	-0.03	-0.00	-0.01
	230	0.71	0.02	0.02	0.02
	380	0.73	0.04	0.02	0.03
	580	0.79	0.10	0.05	0.06
	840	0.08	0.11	0.02	0.05
	1570	0.80	0.10	0.01	0.03
EMR	Unemployed	0.72	0.02	0.00	-0.00
	Employed	0.66	-0.03	-0.00	0.00
EDNR	No formal education	0.59	-0.10	-0.07	-0.06
	Some Primary	0.72	0.03	0.02	0.02
	All Primary	0.80	0.11	0.08	0.07
	Lower Secondary	0.84	0.15	0.09	0.08
	Upper Secondary	0.88	0.19	0.11	0.10
EDNHH	No formal education	0.53	-0.16	-0.10	-0.10
	Some Primary	0.68	-0.01	0.01	0.01
	All Primary	0.74	0.05	0.03	0.03
	Lower Secondary	0.76	0.07	0.01	0.00
	Upper Secondary	0.87	0.17	0.07	0.07

(1)	(2)	(3)	(4)	(5)	(6)
STR	Rural	0.15	-0.02	0.00	-0.00
	Metro Towns	0.26	0.04	-0.02	-0.01
	Towns	0.24	0.06	0.02	0.03

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variable

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

APPENDIX D : TABLE 4.11

SUBGROUP MEANS AND MCA

Dependent Variable	USECRR
Independent Variables	YH, EMR, ACESS, EDNR, EDNHH
Covariates	AGER, COM
Grand Mean	0.17

(1)	(2)	(3)	(4)	(5)	(6)
YH	0	0.00	-0.17	-0.13	-0.11
	20	0.14	-0.03	-0.01	-0.02
	60	0.05	-0.12	-0.08	-0.05
	105	0.07	-0.11	-0.07	-0.05
	155	0.12	-0.06	-0.04	-0.03
	230	0.18	0.01	0.01	0.01
	380	0.23	0.06	0.05	0.04
	580	0.27	0.10	0.07	0.04
	840	0.27	0.10	0.05	0.02
	1570	0.33	0.16	0.11	0.07
EMR	Unemployed	0.72	0.01	-0.01	-0.01
	Employed	0.66	-0.02	0.01	0.01
ACESS	No	0.04	-0.14	-0.12	-0.12
	Yes	0.23	0.06	0.05	0.05
EDNR	No formal education	0.12	-0.05	-0.02	-0.02
	Some Primary	0.19	0.02	0.01	0.01
	All Primary	0.20	0.03	-0.01	0.00
	Lower Secondary	0.29	0.12	0.03	0.04
	Upper Secondary	0.34	0.17	0.05	0.06
EDNHH	No formal education	0.08	-0.09	-0.03	-0.03
	Some Primary	0.16	-0.01	-0.00	-0.01
	All Primary	0.19	0.01	0.00	0.01
	Lower Secondary	0.27	0.10	0.05	0.05
	Upper Secondary	0.31	0.14	0.03	0.04

(1) Variable

(2) Category

(3) Subgroup Mean

(4) Unadjusted Deviation from Grand Mean

(5) Adjusted for Independent Variable

(6) Adjusted for Independent Variables and Covariates

RUMAH TANGGA

TABLE 1 EQUATION 4 DEPENDENT VARIABLE YB

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
EMR	79.88	1.542	51.82	9.103	10.27	0.88
AGER	3.871	0.843	4.59	5.98	5.68	
AGERSO	-0.059	0.134	4.69	-0.077	0.02	8.91
COM1	21.80	1.794	12.15	18.23	2.05	8.91
COM2	22.81	2.322	9.83	24.37	2.57	9.48
COM3	-4.86	10.670	0.46	3.17	11.83	0.27
STR1	5.952	2.335	2.55	-12.62	3.70	3.41
STR2	7.306	2.373	3.08	-6.11	3.25	1.88
EDNR1	10.61	1.714	6.19	2.75	2.20	1.25
EDNR2	23.878	2.312	10.24	11.19	3.12	3.59
EDNR3	73.31	3.71	19.76	65.10	4.26	15.29
EDNR4	235.2	4.397	53.49	249.80	5.28	47.29

RUMAH TANGGA

TABLE 2 EQUATION 5 DEPENDENT VARIABLE YHH

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
EMHH	-39.47	12.19	3.23	-673.4	112.4	5.99
AGEHH	9.00	1.534	5.87	14.55	1.99	7.31
AGEHHSQ	-0.637	0.177	3.58	-0.151	0.003	5.97
COM1	145.3	5.12	35.81	133.70	6.15	21.75
COM2	44.93	6.66	2.11	27.16	8.15	3.33
COM3	36.17	30.28	1.20	-1.321	34.88	0.004
STR1	82.48	6.58	12.56	77.20	7.49	10.31
STR2	38.03	6.70	5.68	30.63	7.68	3.98
EDNHH1	40.24	6.03	6.68	49.58	7.014	7.07
EDNHH2	83.50	6.44	12.97	92.43	7.45	12.40
EDNHH3	171.9	9.30	18.49	170.60	10.52	16.21
EDNHH4	443.6	9.38	47.30	440.5	10.61	41.89

RUMAH TANGGA

TABLE 3 EQUATION 6 DEPENDENT VARIABLE YH

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YR	-0.65	0.019	33.61	-0.71	0.055	12.93
YHH	0.97	0.007	136.9	1.18	0.016	74.03

RUMAH TANGGA

TABLE 4 EQUATION 7 DEPENDENT VARIABLE EMR

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YHH	-0.0001	0.000	4.37	-0.0005	0.0002	2.69
YH	-0.0002	0.0000	4.89	-0.0005	0.0002	3.33
YR	0.003	0.000	48.92	0.0075	0.0011	7.10
NCS	-0.0062	0.0025	2.48	0.0056	0.0041	1.37
AGER	0.015	0.0052	2.86	-0.0095	0.0096	0.98
AGESQR	-0.0001	0.000	1.61	0.0002	0.0001	1.64
COM1	-0.0454	0.0107	4.23	-0.0205	0.0239	0.86
COM2	-0.030	0.0135	2.20	-0.1172	0.0326	3.59
COM3	0.108	0.0612	1.77	0.1150	0.0839	1.33
STR1	-0.144	0.0134	13.79	-0.0382	0.0295	1.12
STR2	-0.144	0.0136	10.58	-0.0613	0.0229	2.68
EDNR1	-0.0928	0.0099	9.41	-0.0562	0.0143	3.94
EDNR2	-0.153	0.0135	11.35	-0.0924	0.0211	4.38
EDNR3	-0.191	0.0224	8.53	-0.2569	0.0640	4.38
EDNR4	-0.3259	0.0299	10.88	-1.092	0.2484	4.40

RUMAH TANGGA

TABLE 5 EQUATION 8 DEPENDENT VARIABLE EMHH

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YHH	-.0000	0.0000	3.15	-0.00009	0.000033	2.95
NCS	0.0055	0.0009	5.89	0.0060	0.0009	6.24
AGEHH	0.0059	0.0137	4.31	0.0062	0.0014	4.39
AGESQHH	-0.0001	0.0000	6.83	-0.0001	0.0000	6.79
COM1	-0.0162	0.0044	3.64	-0.0076	0.0061	1.25
COM2	-0.0288	0.0056	5.19	-0.0026	0.0057	4.59
COM3	-0.0572	0.0251	2.27	-0.0549	0.0253	2.17
STR1	-0.0046	0.0055	0.83	0.0005	0.0060	0.08
STR2	-0.0104	0.0056	1.85	-0.0804	0.0069	1.41
EDNHH1	0.0014	0.0050	2.69	0.0157	0.0052	3.03
EDNHH2	0.0144	0.0054	2.67	0.0192	0.0059	3.25
EDNHH3	0.0024	0.0079	0.30	0.1261	0.0093	1.36
EDNHH4	0.0171	0.0087	1.98	0.0396	0.0153	2.86

RUMAH TANGGA

TABLE 6 EQUATION 9 DEPENDENT VARIABLE DESR

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YH	-0.000	0.0000	1.40	0.0013	0.0004	3.10
YHSQ	-0.0000	0.0000	0.57	-0.0000	0.0000	0.17
YR	-0.0002	0.0002	1.26	-0.0331	0.0044	7.52
NCS	0.2481	0.0089	32.89	0.2571	0.0193	13.65
AGER	-0.0199	0.0156	3.29	0.0856	0.0063	1.37
COM1	-0.287	0.0321	8.94	0.1377	0.1015	1.35
COM2	-0.735	0.0406	18.04	-0.0420	0.1430	2.94
COM3	-0.4802	0.1850	2.60	-0.3252	0.4429	0.73
STR1	-0.355	0.0404	8.77	-0.9652	0.1362	7.09
STR2	-0.185	0.0410	4.50	-0.5461	0.1135	4.81
EDNR1	-0.0985	0.0298	3.31	-0.1427	0.0749	1.91
EDNR2	-0.1615	0.0298	3.31	-0.1144	0.1089	1.05
EDNR3	-0.254	0.0674	3.76	1.4390	0.2782	5.17
EDNR4	-0.223	0.0904	2.47	7.454	1.022	7.29

RUMAH TANGGA

TABLE 7 EQUATION 10 DEPENDENT VARIABLE DESHH

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YH	-0.003	0.00010	2.84	-0.0095	0.0009	10.29
YHSQ	-0.0003	0.0001	2.83	-0.0000	0.0000	0.00
YHH	0.0006	0.0002	2.78	0.0064	0.0007	9.39
NCS	0.1930	0.0075	25.96	0.2425	0.0142	17.13
AGEHH	0.0030	0.0014	2.21	0.0023	0.0023	1.01
COM1	-0.356	0.0386	9.23	0.0071	0.0828	0.08
COM2	-0.989	0.0474	20.89	-1.192	0.0728	16.38
COM3	-0.684	0.213	3.21	-0.672	0.308	2.19
STR1	-0.336	0.0466	7.21	-0.0619	0.0791	7.83
STR2	-0.1430	0.0475	3.20	0.2266	0.0788	2.83
EDNHH1	-0.137	0.0428	3.20	0.2036	0.0709	2.88
EDNHH2	-0.169	0.0463	3.66	0.4459	0.0932	4.73
EDNHH3	-0.342	0.0677	5.05	0.9041	0.1702	5.31
EDNHH4	-0.340	0.0758	4.49	1.812	0.2943	6.16

RUMAH TANGGA

TABLE 8 EQUATION 11 DEPENDENT VARIABLE NCS

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
DESR	0.330	0.0337	9.79	-21.79	2.807	7.76
DESHH	0.190	0.327	5.83	-20.2	3.34	6.05
DESHHR	0.00369	0.00674	0.55	4.40	0.632	6.96
CBD	-0.426	0.0192	22.21	4.07	1.48	2.76
AGER	0.146	0.00283	51,57	- 0.00848	0.0486	0.17
AGEHH	-0.00152	0.00164	0.93	0.0449	0.0134	3.36
COM1	0.0541	0.040	1.34	1.46	0.606	2.40
COM2	0.773	0.0515	1.50	0.826	0.537	3.28
COM3	0.0363	0.227	0.160	-6.664	2.20	3.03
STR1	-0.0142	0.0500	2.10	-1.22	0.558	2.18
STR2	-0.0145	0.0501	0.29	-0.330	0.493	0.67
ATTFP1	-0.0141	0.107	0.13	-0.323	0.788	0.410
ATTFP2	-0.174	0.132	1.31	0.622	0.979	0.636
ATTFP3	-0.226	0.113	2.00	-0.780	0.835	0.94
EDNR1	-0.0262	0.376	0.70	1.19	0.297	4.00
EDNR2	-0.361	0.052	7.00	0.826	0.428	1.92
EDNR3	-0.666	0.0852	7.82	0.684	0.657	1.04
EDNR4	-1.22	0.107	11.39	-1.63	0.861	1.89
EDNHH1	0.284	0.0459	6.19	0.275	0.349	0.79
EDNHH2	0.193	0.050	3.81	-0.121	0.431	0.281
EDNHH3	0.068	0.072	0.94	-0.996	0.637	1,56
EDNHH4	-0.243	0.0824	-2.96	-1.90	0.819	2.32
USENEVR	-0.859	0.036	-23.84	-1.70	0.316	5.37

RUMAH TANGGA

TABLE 9 EQUATION 12 DEPENDENT VARIABLE CBD

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YH	-0.00007	0.00004	2.03	-0.0010	0.0003	3.11
NCS	-0.0847	0.0047	18.03	0.0135	0.0062	2.17
AGER	0.0412	0.00139	29.65	0.0319	0.0020	15.89
COM1	-0.321	0.0206	15.57	-0.246	0.0484	4.57
COM2	-0.00607	0.0260	15.57	-0.0416	0.0254	1.51
COM3	-0.351	0.118	2.98	-0.3171	0.1241	2.55
STR1	-0.149	0.0258	5.76	-0.0615	0.0367	1.67
STR2	-0.1307	0.0262	5.00	0.0731	0.0337	2.17
EDNR1	-0.0578	0.0196	2.96	-0.0219	0.0241	0.91
EDNR2	-0.158	0.0269	5.85	-0.0496	0.0388	1.28
EDNR3	-0.146	0.0447	3.26	0.0518	0.0657	0.78
EDNR4	-0.179	0.0566	3.16	0.1441	0.0924	1.56
EDNHH1	-0.0232	0.0235	0.99	-0.0167	0.0285	0.59
EDNHH2	-0.0683	0.0259	2.64	-0.0139	0.0395	0.35
EDNHH3	-0.121	0.0376	3.21	0.0502	0.0753	0.67
EDNHH4	-0.189	0.0445	4.25	0.2173	0.1446	1.50

RUMAH TANGGA

TABLE 10 EQUATION 13 DEPENDENT VARIABLE ACESS

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YH	0.00007	0.00002	3.55	0.0046	0.0006	7.67
EMR	-0.00233	0.00971	0.24	2.023	0.3853	5.25
AGER	-0.00276	0.000683	4.04	-0.0410	0.0056	7.27
COM1	-0.0381	0.0117	3.25	-0.5475	0.07753	7.06
COM2	-0.0244	0.0147	1.66	-0.1506	0.0484	3.11
COM3	-0.0762	0.0661	1.15	-0.3354	0.2046	1.64
STR1	0.000779	0.0146	0.0534	0.1565	0.0842	1.86
STR2	0.0396	0.0147	2.69	0.1336	0.0689	1.94
ATTFP1	0.436	0.0311	14.01	0.3256	0.0958	3.40
ATTFP2	0.220	0.0386	5.69	0.0567	0.1196	0.48
ATTFP3	0.253	0.0330	7.65	0.1270	0.1016	1.25
EDNR1	0.0661	0.0110	6.01	0.0432	0.0393	1.10
EDNR2	0.110	0.0151	7.29	-0.0015	0.0583	0.03
EDNR3	0.122	0.0250	4.87	-0.4076	0.1034	3.94
EDNR4	0.132	0.0317	4.16	-1.397	0.2375	5.88
EDNHH1	0.102	0.0132	7.75	0.0315	0.0455	0.69
EDNHH2	0.1267	0.0146	8.70	0.0378	0.0640	0.59
EDNHH3	0.0982	0.0211	4.65	-0.3348	1.0828	3.10
EDNHH4	0.154	0.0249	6.20	-1.318	0.2179	6.05

RUMAH TANGGA

TABLE 11 EQUATION 14 DEPENDENT VARIABLE USECRR

	OLS			TSLS		
INDP. VAR.	B	STD D	T	B	STD D	T
YH	0.0000537	0.000165	3.25	-0.0029	0.0016	1.85
EMR	0.0124	0.0078	1.59	-0.016	0.8385	1.21
ACESS	0.1402	0.00823	17.02	2.557	0.2376	10.76
DIFFR	-0.0161	0.00235	-6.86	0.0242	0.0096	2.53
DIFFHH	-0.0161	0.00219	6.15	0.0036	0.0090	0.40
AGER	0.0212	0.00443	5.00	0.0157	0.0364	0.43
AGESOR	-0.000403	0.0000703	5.75	0.0003	0.0004	0.75
COM1	0.0698	0.00946	7.38	0.4994	0.1806	2.76
COM2	-0.0609	0.0121	5.05	0.1322	0.0693	1.91
COM3	-0.0426	0.0530	0.80	0.2967	0.2285	1.30
STR1	0.0280	0.0116	2.41	-0.0083	0.1149	0.07
STR2	0.0280	0.0118	1.86	-0.0853	0.0912	0.94
ATTFP1	0.0839	0.0251	3.33	-0.8804	0.1216	7.24
ATTFP2	-0.0130	0.0310	0.420	-0.4606	0.1209	3.81
ATTFP3	-0.0125	0.0266	0.49	-0.5618	0.1050	5.35
EDNR1	0.0254	0.00883	2.87	-0.0996	0.0430	2.32
EDNR2	0.0331	0.0122	2.71	-0.1648	0.0606	2.72
EDNR3	0.0736	0.0201	3.66	0.0746	0.1766	0.42
EDNR4	0.101	0.0254	4.00	0.5960	0.5432	1.10
EDNHH1	0.00798	0.0106	0.75	-0.1552	0.0468	3.32
EDNHH2	0.0338	0.0171	2.89	-0.1649	0.0677	2.44
EDNHH3	0.0723	0.0169	4.30	0.1658	0.1445	1.153
EDNHH4	0.0580	0.0201	2.88	0.6439	0.4645	1.39

SEAPRAP

THE SOUTHEAST ASIA POPULATION RESEARCH AWARDS PROGRAM

PROGRAM OBJECTIVES

* To strengthen the research capabilities of young Southeast Asian social scientists, and to provide them with technical support and guidance if required.

* To increase the quantity and quality of social science research on population problems in Southeast Asia.

* To facilitate the flow of information about population research developed in the program as well as its implications for policy and planning among researchers in the region, and between researchers, government planners and policy makers.

ILLUSTRATIVE RESEARCH AREAS

The range of the research areas include a wide variety of research problems relating to population, but excludes reproductive biology. The following are some examples of research areas that could fall within the general focus of the Program:

* Factors contributing to or related to fertility regulation and family planning programs; familial, psychological, social, political and economic effects of family planning and contraception.

* Antecedents, processes, and consequences (demographic, cultural, social, psychological, political, economic) of population structure, distribution, growth and change.

* Family structure, sexual behaviour and the relationship between child-bearing patterns and child development.

* Inter-relations between population variables and the process of social and economic development (housing, education, health, quality of the environment, etc).

* Population policy, including the interaction of population variables and economic policies, policy implications of population distribution and movement with reference to both urban and rural settings, and the interaction of population variables and law.

* Evaluation of on-going population education programs and/or development of knowledge-based population education program.

* Incentive schemes — infrastructures, opportunities; overall economic and social development programs.

SELECTION CRITERIA

Selection will be made by a Program Committee of distinguished Southeast Asian scholars in the social sciences and population. The following factors will be considered in evaluating research proposals:

1. relevance of the proposed research to current issues of population in the particular countries of Southeast Asia;
2. its potential contribution to policy formation, program implementation, and problem solving;
3. adequacy of research design, including problem definition, method of procedure, proposed mode of analysis, and knowledge of literature;
4. feasibility of the project, including time requirement; budget; and availability, accessibility, and reliability of data;
5. Applicant's potential for further development.

DURATION AND AMOUNT OF AWARDS

Research awards will be made for a period of up to one year. In exceptional cases, requests for limited extension may be considered. The amount of an award will depend on location, type and size of the project, but the maximum should not exceed US$7,500.

QUALIFICATIONS OF APPLICANTS

The Program is open to nationals of the following countries: Burma, Indonesia, Kampuchea, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam. Particular emphasis will be placed on attracting young social scientists in provincial areas.

Applications are invited from the following:

* Graduate students in thesis programs

* Faculty members

* Staff members in appropriate governmental and other organizations.

Full-time commitment is preferable but applicants must at least be able to devote a substantial part of their time to the research project. Advisers may be provided, depending on the needs of applicants.